TANGANYIKA

DEPARTMENT OF AGRICULTURE

ANNUAL REPORT

1951

PARTS I AND II

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TANGANYIKA

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INTRODUCTION

Agricultural Policy

Agriculture remains the main occupation of the population of Tanganyika and agricultural policy does not change much from year to year. An annual report of this kind seeks chiefly to record the progress made towards the main objects, together with the facts and statistics illustrating the ups and downs which inevitably occur in an industry which is dependent upon the weather.

The main objects remain the production of raw materials for export or for processing within the Territory, and the provision of food for all the inhabitants.

Self-sufficiency in food together with a high-level of cash crop production are the two essential features of Tanganyika's agricultural policy. This statement could be expanded to include the means of increasing production, the maintenance and restoration of soil fertility, the creation of conditions suitable for farming, and the extension of the settlement of farmers of all races into new country.

Weather and General Review

For the second year in succession the Territory produced enough food for the requirements of the home population, and for feeding the inhabitants of the towns and the labour employed in industry.

This happy result was, of course, largely due to the excellent rains, but one ventures to hope that grain production to the level of self-sufficiency will be maintained, because it is thought that a real increase in the area cultivated has been brought about by the guaranteed prices and minimum returns given to farmers and by the alienation of new land for farming, coupled with the high prices received for agricultural produce as compared with pre-war times.

The amounts of maize and sorghum known to have been purchased are given later in this report. The 1951 total was, as in 1950, a very substantial one, and the succession of two large crops made it necessary to export a bulk of the order of 6,000 tons of maize surplus to requirements, and in excess of the Territory's substantial storage capacity.

Dried cassava root, oil seeds and vegetable oils, beans, and other human and animal foodstuffs surplus to the needs of the Territory, figured in the lists of

exports. Shipments of sisal, coffee, tea, tobacco, cashewnuts and other crops mainly for overseas markets approached or exceeded previous record figures. Cotton maintained its place among the more important exports.

At the Provincial stations in the Central, Western, Lake and Southern Highlands provinces the rainfall during the January to September cropping season was above average, while many areas in the Eastern, Northern, Tanga and Southern provinces also enjoyed ample rains. During the last three months of the year there were heavy falls in the Eastern, Western, Lake, Southern, Southern Highlands, and Tanga provinces, but fortunately these were late enough to avoid any serious disturbances of harvesting, while inducing good yields of "short rains" crops.

African Agriculture

The feeling of security engendered by the generally excellent harvests of 1950 was renewed in 1951, but the lessons of the 1949-50 food shortages and the threat of locust invasion—which happily did not materialize—aided those responsible for encouraging adequate planting of food crops in general and root crops in particular. The result was that although the cultivation of cash crops by African growers was at the highest level since the war years, the Territory's granaries were full, grain and cassava root was exported, and the planting of root crops was, in nearly all districts, more extensive than before.

Notable features of the year included the record tonnages of maize sold by the native growers in many areas; the record paddy crops in the Eastern Province and the greatly increased demand for tractor-ploughing in the Rufiji District; the prosperity of the native coffee growers of the Bukoba and Kilimanjaro areas; the substantial exports of dried cassava and cashewnuts from the Southern Province and the increased cultivation of castor seed in the majority of provinces; the successful stimulation of native groundnut cultivation by an increase in the price to the grower and the efforts of Government officers; and the general acceptance of the utility of "parish" and area Councils in the sphere of the Sukumaland Development Team's land-usage activities.

It is probably true to say that the average African is content with little more than a bare sufficiency of his customary "consumption goods" and also has little desire, unless stimulated, to amass capital in the form of goods or cash. There are, of course, exceptions to this generalization. With the ruling high wage-rates, and high prices for his products, any reasonably industrious African can earn substantial sums by working on a farm or estate or cultivating a few acres of land—and no African in Tanganyika need be landless or even approaching that condition. To be frugal as regards "consumption goods" is certainly not undesirable, but frugality as regards capital equipment is folly in a time of prosperity such as the present.

It has been argued that the only capital equipment which an African agriculturist requires is a wife and a hoe, or multiples of this useful unit, but such times are passing. Apart from advising on the purchase of tractor-ploughing equipment by the Africans' own Native Authorities, the Department of Agriculture has actively encouraged and facilitated the purchase of capital goods and equipment by the individual African and by associations and co-operatives. Such goods range from minor items like pruning shears, wheel-

barrows (and even rat-traps!) to such substantial investments as ox-ploughs, ox-carts, coffee pulpers, hand-mills, and the buildings and equipment for village produce stores and the more ambitious co-operatives and co-operative unions. A difficulty which has been encountered, and which is somewhat inexplicable, is the lack of many useful capital goods in the upcountry shops.

Estate Agriculture

Apart from some 11,766 tons of hand extracted fibre produced by Africans from boundary-hedge and "wild" sisal, the output of sisal was by non-native enterprise, and the 133,459 tons produced by estates constituted by far the most valuable export product of the Territory. Deliveries of parchment coffee grown by estates in the Northern, Tanga, and Southern Highlands provinces during the 1951-52 seasons are expected to total some 2,500 tons. Nearly 3,000,000 lb. of flue-cured tobacco, over 2,347,000 lb. of tea, some 1,600 tons of seed-beans, 8,805 tons of plantation sugar, and 301 tons of pyrethrum were produced.

In addition to the large contribution to food supplies in the form of maize, wheat, beans and other food crops made by non-native farming, a further large quantity, which does not appear in statistics, was grown by estates for consumption by their own workers. The sisal industry was particularly important in this respect. Many other crops such as papain, kapok, cotton, essential oils, cinchona, copra, castor seed, fruits, and vegetables were grown by non-natives.

As compared with estate production in 1950 the 1951 returns and estimates indicate changes of the following order:

Sisal: Estate production showed an increase of nearly ten per cent.

Tea: Factory output increased by some thirty per cent.

Coffee: Deliveries of coffee from the 1951-52 crop are expected to exceed 1950-51 deliveries by some forty per cent.

Flue-cured Tobacco: Production increased by at least three per cent according to figures received.

The rise in the output of sisal and tea is attributable to the good growing season and in no small degree to the increased plantings of recent years now coming into production. In the case of coffee the rise may be due, largely, to the biennial bearing habit of Arabica coffee, but substantial areas of new plantings are expected to maintain the increase in output. Acreages under tobacco, sugar-cane, maize, and papaw (for papain production) increased during the year, and yields were, in most cases, excellent.

The export value of estate produce has become a less useful indication of output in recent years, owing to high world prices. The fact that the total f.o.b. value of the sisal produced in 1951 was more than twice the value of the sisal produced in 1950 –although the tonnage produced was not quite ten per cent greater—must be considered in conjunction with the rise in cost of labour and supplies before a true picture of an expanding and prosperous industry can be obtained. Building materials, fuel, vehicles, foodstuffs, and the majority of other estate supplies, increased in cost during the year; rates of pay for labour rose sharply during late 1950 and early 1951, as did the cost of recruitment and transport to the estates and farms.

The food crop farmers and coffee-growers of the Northern Province (in particular) had difficulty in finding sufficient workers to gather their abundant crops.

The year was, however, both a productive and a prosperous one, making up for the lean years which settlers and estates have gone through in the not very distant past. The healthy state of the Territory's public finances is partly attributable to the prosperity of its agriculture—native and non-native—during 1950 and 1951.

Marketing and Grading

The purchase of maize, wheat, white sorghum, mixed beans, and paddy, remained under Government control at prices fixed at railhead or grain store. Non-native farmers and some Africans delivered their produce in ten-ton lots at these points, but the greater part of the African crop was sold in small parcels at Native Authority markets at which controlled deductions for transport were allowed.

Wheat was purchased by grade in the Northern Province, but generally speaking other food grains had only to reach an f.a.q. standard, with the proviso that maize should be brought to market with a moisture content not exceeding thirteen per cent weight, penalties for non-compliance being enforced. Penalties for the presence of Datura seed in wheat were also prescribed.

The basic prices paid for foodstuffs were higher than in 1950, and a comparative table is given below:—

	1950 Shs.	1951 Shs.
Maize and Sorghum (unbagged)	21/-	28/80 per 200 lb.
Wheat—Grade I (unbagged)	37/25	45/33 per 200 lb.
Mixed Beans (unbagged)	26/40	49/20 per 200 lb.

The price paid for wheat in the Southern Highlands was Shs. 45/13 per 200 lb. f.a.q. at the Iringa mill.

Other produce not included in the above was price controlled at the following rates applicable to railhead:—

	1950 Shs.	1951 Shs.
Groundnuts (per 100 kg. unbagged)	44/-	55/-
Sesame (per 100 kg. unbagged)	44/-	55/-
Dried Cassava (per 100 kg. unbagged)	11/-	27/40 bagged Southern Province.
Dried Cassava (per 100 kg. unbagged)	11/-	24/40 bagged Central Line.

The price of paddy was also under control.

African-produced dark fired tobacco grown in the Southern Province was, as formerly, sold by the Ngoni-Matengo Native Co-operative Union through the Songea Native Tobacco Board; the Western Province crop was disposed of through the Nyamirembe Native Tobacco Board. The former Board sells a substantial proportion of its output overseas, the latter, at present, relies entirely upon the demand in East Africa.

The Southern Highlands Non-Native Tobacco Growers' Union, which is a growers' organization for grading, re-drying and marketing the bright flue-cured leaf of the Iringa District, had some difficulty with a consignment of the 1950 crop, which had been insufficiently processed before dispatch. The

repercussions were felt in 1951, and led the Union to appoint the Director of Agriculture as Chairman of its Board of Directors. The Union's marketing agent now posts a leaf expert at Iringa when the tobacco is being processed and baled, and the effects have been seen in the improvement in the quality of the 1951 crop and in the prices received.

The Tanganyika Pyrethrum Board maintained its close association in marketing policy with the Kenya growers and continued to dispose of the crop through the same agent. The price received is based on sampling and chemical analysis.

The 1951/52 coffee crop is the last of the period covered by the contracts made between the Tanganyika Coffee Growers' Association, in conjunction with the Kilimanjaro Native Co-operative Union, and the United Kingdom Ministry of Food. The African body has given notice of intention to market its own coffee separately on the expiry of the contract.

The Bukoba Native Coffee Board, which also has a contract for part of its crop, was in process of delivering the last quota at the end of the year. Negotiations for further contracts both for mild and hard coffees had then commenced, and substantially higher prices were being discussed.

The cotton crop was marketed under Defence Regulations, and bulk sales were made to the Raw Cotton Commission at the very satisfactory price of 50d. per lb. f.o.b. for Mwanza cotton and 55d. for the Central Line crop. The export arrangements were in the hands of the Uganda Lint Marketing Board and the Eastern Province Exporters' Group respectively. One thousand five hundred bales of Lake Province cotton and 500 bales of Central Line cotton were reserved from the bulk for sale by auction.

Price control of tea was continued; the growers' organizations agreed to ensure that adequate supplies of tea were provided for East African consumption while the price was allowed to rise by an average amount of a shilling a pound.

Production Committees

Production Committees set up under the Crops (Increased Production) Ordinance—the life of which was extended during the year—continued to operate in the non-native farming areas of Arusha, Moshi, Mbulu, Kilosa, Morogoro and Iringa.

A basic function of these committees is to recommend to the Director of Agriculture the eligibility of farmers for the "minimum return" payments which are payable in respect of certain crop failures, or partial failures. These payments are designed to encourage non-native farmers to grow sizeable acreages of the basic foods of the population rather than to concentrate exclusively on other often more profitable crops. The record tonnages of maize produced by the non-native farmers of the Northern Province in 1951 were, no doubt, due in part to the security provided by this guarantee of a minimum return for the farmers' labours. A total of £6,188 was paid to farmers in 1951 in respect of partial and complete crop failures, chiefly of wheat and maize.

The Committees discussed a wide range of farming topics, the minutes of their meetings being regularly brought to the notice of Government. They thus acted as a most useful sounding board.

The executive officers of the Northern Province Production Committees started the issue of a monthly bulletin during the year, and this development seems to have been appreciated by the farmers. The executive officers of the Committees are paid from Government funds and attached to the Department of Agriculture.

Agricultural Finance

The provision of loans on favourable terms remained the function of the Government-sponsored Land Bank of Tanganyika, and the Local Development Loan Fund Committee—the former dealing with applications by non-native farmers and planters for development and crop loans and the latter providing facilities for African agriculturists.

The District Production Committees dealt, in the first instances, with farmers' applications for crop loans –advising the Land Bank in the light of their local knowledge. Applications for loans made by individual Africans and for loans to assist the establishment of tractor-ploughing services and other local developments benefiting the African population, were considered locally by the administrative and technical officers of the district or province, and guaranteed by the local Native Treasury before final submission to the local Development Loan Fund Committee. Applications by individual Africans were not on a large scale, but a number of useful activities by local Native Authorities received assistance.

The Kenya Farmers' Association and the Southern Highlands Non-Native Tobacco Growers' Union granted short-term loans—or their equivalent in credit—to farmer members.

Vermin, Insect Pests and Diseases

Vermin, pests and diseases took their toll from the generally ample crops, but although the losses, in aggregate, were considerable, it cannot be said that they were unusually high. The Territory was fortunate in being spared a locust invasion which threatened throughout the year.

Rats and field mice, particularly the former, were about in very large numbers in 1951, and caused substantial damage to growing and harvested grains and to cotton in the boll. All provinces reported these vermin, but the damage in the Northern Province was particularly heavy. The heavy rains of the later months of the year, in most provinces, drove rats and mice from the fields and may have reduced their numbers. The ingenuity of cultivators and officers of the Department found full scope in devising, improvising and adopting, almost every conceivable device and technique for the destruction of rodents, ranging from the new anti-coagulent materials to the homely break-back with barium carbonate the most generally used poison, and a tail-bounty performing good services. Hippopotami were in the news owing to their depredations in paddy fields, and the losses due to baboon and wild pig were severe enough for these creatures to remain branded as vermin.

Insect pests abounded, and in the Eastern Province in particular, the cotton crop was severely affected by bollworm and stainer. Plans were made for a fairly large scale field trial of power-dusting, with a D.D.T./B.H.C./Talc dust which proved effective when applied to cotton with hand dusters in 1951. Sisal weevil continued to cause losses, and it is hoped that the intensive work on control measures being carried out at the Sisal Research Station will be

brought to a successful conclusion. The heavy incidence of maize stalk-borer caused concern, it being reported that as many as thirty-seven per cent of the plants in the Tabora District were infested. White borer of coffee caused serious losses in the Kilimanjaro area and a well-organized campaign sponsored by the Department and the Territorial Coffee Board resulted in the uprooting and burning of some 20,000 infested coffee trees and some 77,000 alternative host trees—together with a haul of 46,000 adult borers paid for at ten cents each. It is of interest that no borers were found at an altitude greater than 4,200 feet. Minor pests were reported to be causing damage to the usual extent.

The year saw the outbreak—perhaps as new arrivals to the Territory—of a bacterial blight of peas (caused by *Pseudomonas pisi*) and the potentially more serious Panama Disease of bananas (caused by *Fusarium oxysporum forma cubense*). Both these outbreaks occurred in the Northern Province, the bacterial blight of peas being later identified in the Usambaras and the Southern Highlands. The damp and overcast conditions which prevailed during part of the growing season led, not unnaturally, to somewhat severe outbreaks of stem-rust in wheat, pink ear-rot in maize, late blight of potatoes, and a noticeable degree of infection by bacterial blight of cotton.

Virus diseases probably occur in the Territory to a wider extent than at present realized, but one at least has received intensive study—the mosaic disease of cassava. East Africa suffered a serious loss on the death of Mr. Nichols early in 1951 but many of the mosaic resistant varieties bred by him are now under local trial at the Department's experimental stations and farms—and show great promise for situations where they are not devoured by wild pigs. A hoped-for development is the production of mosaic-resistant "bitter" cassava which the wild pig do not favour.

Locusts

Throughout the year invasion by the desert locust threatened from the north-east. Small swarms entered the Northern Province from Kenya, but caused no damage, and no egg-laying was reported. Officers, scouts, and stocks of poison and supplies were provided by the Desert Locust Control, Nairobi, in the Northern and Tanga provinces, and all officers of the Department were alert and ready to assist in any necessary campaign of destruction. The danger fluctuated throughout the year, but at no time could it be said that any relaxation of precautions was possible. April and October were the times of greatest danger.

The International Red Locust Control Service kept the recognized danger areas of Lake Rukwa and the Malagarasi swamps under observation, and although some hatchings occurred no damage to crops was reported.

Agricultural Exports, 1951

The table forming Appendix II shows the very considerable increases in both the tonnage and value of the Territory's exports of agricultural products, as compared with previous years. The substantial exports of grain-crops, groundnuts, beans and pulses, dried cassava root, and other food crops, are an indication of the very satisfactory state of the Territory's food reserves during 1951. Record tonnages of sisal, tea, sunflower seed, and castor seed were exported; exports of coffee, cashewnuts and beeswax were greater than for a number of years; and shipments of cotton were substantially greater than during 1950.

NOTES ON MAIN CROPS

Sisal

Estates produced nearly ten per cent more line fibre and tow than in 1950 and the 11,764 tons of hand-extracted sisal estimated to have been produced by natives from boundary-hedge plantings was nearly twice the 1950 tonnage. Some eight per cent of estate production is in the form of tow, extraction from flumes now being undertaken by most, if not all, estates. Estates made still greater use of mechanical clearing and cultivating equipment. There was a substantial rise in the rates of pay for estate workers, but the supply of labour fell short of the demand in spite of such innovations as the chartering of aircraft to transport recruits. Unusual weather conditions resulted in sun scorch in some areas, but though this may result in a decrease in the percentage of the higher grades of fibre during 1952 no reduction in total yield is expected to result either from this or from the exceptionally heavy rains which occurred during the second half of the year.

The Sisal Experimental Station's new laboratories are now very well equipped with modern apparatus and the addition of a Soil Chemist to the staff has permitted the planning of an expanded research programme.

The following figures show the production, export, and export value, of line fibre and tow for the last five years. The Tanga and Northern provinces produce some sixty per cent of the Territory's sisal, the Eastern Province some thirty per cent, and the Southern, Lake, and Western provinces the remainder:

Year	*Production Tons*	*Exports Tons*	*Value £*
1947 ...	105,552	95,856	5,469,443
1948 ...	120,622	117,092	8,934,461
1949 ...	123,296	132,514	11,111,232
1950 ...	121,598	118,909	11,846,057
1951 ...	145,225	142,106	23,689,454

It will be seen from the table that the average price of sisal was over £166 per ton as compared with under £100 in 1950. Market quotations rose at one time to £245 c.i.f. per ton for No. 1 Grade, and at the end of the year remained at the very high level of £213 c.i.f., an indication of the prosperity that reigns in this, perhaps the most important of Tanganyika's industries.

Coffee

The production of both Arabica and Robusta coffee showed a further increase. Stable and remunerative prices have permitted considerable outlay on the improvement of both native and non-native plantings. The acreage under the crop has undoubtedly increased during the year, more particularly as regards native plantings. The individual native grower's reaction to good coffee prices is to increase plantings rather than improve existing coffee areas, but the Boards and Departmental officers concerned have done much to safeguard future yields by borer-control measures, better pruning, soil conservation, manuring and mulching, and the use of good seed for new plantings. There were notable achievements in the Northern Province in these matters.

A higher proportion of sun-dried cherry ("buni") than usual was produced by non-native estates. This was perhaps due as much to the prevailing "buni" price as to the reason—lack of harvest labour—given by many estates. Labour shortage is, however, undoubtedly affecting both harvesting and

cultivating methods on non-native estates, a trend towards "buni" production and mechanical cultivation (where practicable) being reported.

In the Northern Province the 1950/51 native crop showed an increase of some twenty-five per cent over the previous season. 1950/51 estate production of parchment coffee was down by some twenty per cent as compared with the previous season, but the 1951/52 crop is expected to be back to the 1949/50 figure. The Moshi Native Coffee Board's propagating centres distributed some 96,000 seedlings from selected mother trees, and an officer of the Department has been seconded to the Board to supervise the field work of the 138 native instructors and inspectors. The Coffee School, with sixty-five pupils, is in course of development under Mr. Swainson, recently Director of Agriculture, Zanzibar. The Coffee Research Station at Lyamungu reports a crop of eighty-eight tons from a cropping area of 126½ acres, including nine acres in their first bearing year—substantial proof of the Station's ability to grow coffee. New experiments laid down during the year should further elucidate the respective advantages of clonal and seedling trees, and their reactions to standard, and modified, single-stem and multiple-stem pruning.

The important Lake Province crop showed an increase over last year's. Nine thousand tons had left Bukoba by the end of the year, the total Bukoba Robusta and Arabica crop being expected to exceed 10,000 tons, as compared with the 1950 crop of 8,000 tons. Hulling facilities in the Province were overloaded. The small Bugufi crop of Arabica coffee was 126 tons, 100 tons below the 1950 figure.

In the Southern Highlands the native crop from the Rungwe area was a poor one, 262 tons as compared with 330 tons in 1950, this being attributed to the well-known biennial bearing habit of Arabica coffee. In the Mbosi area extensive new native plantings are reported, and on non-native plantations there was renovation and improvement and some new planting. Yields in the Mbosi area are low, by Territorial standards, but the coffee is of a quality much sought after by blenders. The "wither-tip" disorder is under investigation at the Mbosi sub-station of the Lyamungu Experimental Station but the cause of the condition has not yet been discovered.

Morogoro, Songea, the Pares, and the Usambaras, all report increased production, new plantings, and renovation. The formation of the Usambara Native Coffee Growers' Co-operative Society was in line with similar developments elsewhere in past years.

The following table shows production estimates for the crop harvested during the latter half of 1951 and early 1952, by districts, and a comparison with the previous season's totals:—

Province and District	*Estimated Production (in tons)*					
	Native-Grown				Estate-Grown	
	Arabica		*Robusta*		*Arabica*	
	1950/51	1951/52	1950/51	1951/52	1950/51	1951/52
Northern (all) ...	5,455	5,070	—	—	1,600	2,500
Tanga, Handeni ...	—	—	7½	10	—	—
Usambaras ...	40	50	—	—	70	70
Pares ...	56	70	—	—	—	—
S. Highlands (all)	370	405	—	—	294	215
Southern, Songea	110	124	—	—	—	—
Eastern, Morogoro	122	84	(includes some estate-grown).			
Lake (all) ...	1,845	2,124	6,420	8,500	—	—
Total ...	7,998	7,927	6,427½	8,510	1,964	2,785

The total of the territorial cotton crop was estimated to have been 46,686 bales in 1951 as compared with 49,715 in 1950.

The Lake Province produced some 41,400 bales, a small improvement over last year's output. This improvement could, it is thought, have been substantially greater had not the people been in that care-free state induced by the knowledge that their granaries were full after a good harvest, and had their profits from cash crops, including hedge-row sisal, not been so great. As a result of these influences the cotton crop was not planted as early as it should have been. The cotton-planting rains (late 1950) were furthermore somewhat sporadic in Sukumaland. Later, weather conditions were, however, very favourable for the Lake Province crop. Some response to the campaign to delay maize planting until February, as an anti-Bollworm measure, is reported. Pest damage was, in general, slight, but poorly grown stands suffered from bacterial blight.

The Eastern Province crop was very considerably below last year's figure of 8,433 bales. The high prices obtaining for castor and sunflower, crops which require less labour, have had the effect of reducing the acreage of cotton, and in those areas where damage by insect pests is severe and frequent many cotton growers are losing heart. There were heavy attacks of American bollworm, and widespread losses due to field mice, Lygus, Stainer, and Pink Bollworm. Delayed harvesting, due to the ample food-crop harvests prior to cotton-picking time, resulted in a high proportion of low-grade cotton and also actual losses of crop.

In the Northern and Tanga provinces production is confined to the plains areas of the Moshi, Pare, Handeni, and Lushoto districts. The season was a favourable one, but the crop is undoubtedly losing favour and once again the acreage in the Handeni District was far below that grown some years ago, for reasons similar to those quoted in connection with the Eastern Province, together with an increasing and welcome tendency to grow food-crops for sale. Stable food-crop prices, better transport, and more markets, have enabled this change to occur.

In the Southern Province cotton cultivation continues to decline in the Lindi and Mikindani districts, while making headway in the remote Tunduru District.

The production of lint, in bales of 400 lb. was as follows:—

Province	1940-1949 (Average)	1948	1949	1950	1951 (estimated)
Lake	35,122	45,381	37,361	38,905	41,464
Eastern	9,786	7,205	12,579	8,433	3,047
Northern	1,253	185	398	1,356	2,030
Tanga	1,010	914	668	849	
Southern	753	148	304	172	145
Total ...	47,926	53,823	51,308	49,715	46,686

In 1951 the improved variety U.K.46 was in use throughout the Lake Province, apart from an area in the Geita District where 300 tons of the newer U.K.48 were distributed. On Kome Island a recent strain, U.K.51, was planted for extended multiplication. A selection from the local strain was planted in

the Eastern Province for extended multiplication, and in the Pare and Korogwe areas the strain formerly in use was entirely replaced by a strain originating from Uganda, which has been grown for some years in the Moshi District.

The progress report of the Chief Scientific Officer of the Empire Cotton Growing Corporation is printed in the Reports of Technical Officers and Specialists. The possibilities of large-scale cotton pest control by means of dusting are being investigated by Departmental and Corporation staff in the Eastern Province, and a substantial tonnage of BHC/DDT/Talc dust has been ordered for use in 1952.

It is reported from the Lake Province that the bulk of the planting for the 1952 crop was completed before the end of 1951, and the 1952 crop production is expected, if weather conditions are favourable, to exceed that of 1951.

Groundnuts

As the result of an increase in the price to the grower, and the availability of seed stocks from 1950 harvests, there was a very substantial increase in the tonnage grown and marketed, as indicated in the following table:—

Province	*Marketed Tonnage*	
	1950	1951
Western	475	2,301
Central	383	1,183
Lake	296	1,051
Southern	21	835
Total ...	1,175	5,370

This is a very satisfactory outcome of an effort to restore groundnuts to a position of importance as a native-grown cash and food crop.

Sunflower

The season was generally favourable for this crop, which has increased in popularity, except in the Southern Highlands and Central provinces where the marketed tonnage has declined, due, in part, to the high prices offered during the year for castor seed.

The cultivation of sunflower seems to result in little or no reduction in the acreage of groundnuts, as sunflower is generally grown on the heavier soils, which are less suitable for groundnuts. It is a crop which is easily grown and harvested, involving far less labour than, for example, cotton.

Province	*Marketed Tonnage*	
	1950	1951
Lake	107	495
Western	630·5	1,172·5
Eastern	623	816
Central	202	149
Southern	1,259	1,404
Southern Highlands	1,194	800
Northern...	1,186	1,237
Tanga (Handeni District) ...	—	350 (Approx.)
Total ...	5,201·5	6,423·5

In the Northern Province some 200 tons are reported to have been produced on non-native estates, but apart from this the crop is primarily a native-grown one at present.

Sesame

The crop gained in popularity in the Southern Province, which is the main producing area, and appears to be regaining the position which it held prior to the drought of 1949.

Province	*Reported Marketed Tonnage*	
	1950	1951
Southern	1,740	3,145
Eastern	385	279
Lake	12	37
Total ...	2,137	3,461

The oil-yield of the once popular "Lindi White" strain is being investigated. Mixed strains are now generally grown and it is thought that it may be desirable to re-introduce "Lindi White", if it is, in fact, superior.

Grain Crops

(a) *Rice*

The year was, in general, a favourable one for paddy, and in the Eastern and Western provinces both yields and acreages were substantially greater than in 1950. The increase in the former Province was largely due to the 3,000 acres of additional paddy which resulted from the Rufiji Native Authority Ploughing Scheme, under the technical and field direction of Departmental staff. In the Southern Highlands the marketed total was less than half that of 1950, this fall being attributed to a decrease in natural flooding in the Rungwe area having a disproportionate effect on yields owing to the local methods of growing. In contrast, it is stated that the Mbeya growers have adopted the methods of the Baluchi Indians, with good results. In the Lake Province yields were good, but there was a lack of interest in taking advantage of the high water-table which resulted from the good rains of the previous year, due, no doubt, to the general optimism which the good crops of 1950 engendered among cultivators. In the Western Province the crop was more than double last year's and irrigation dams constructed under the direction of Departmental staff played their part in achieving this result. Throughout the Territory the popularity of rice as an African food, and the tendency for considerable quantities to be sold other than at the authorized markets, has resulted in the market figures becoming less representative of actual production than was the case in former years.

The tonnage which passed through the produce markets is given in the following table:—

Province	*Marketed Tonnage*	
	1950	1951
Eastern	6,024	9,305
Central	20	23
Southern Highlands	3,228	1,336
Southern	2,783½	2,755½
Western	914	2,037 (plus post-market sales)
Lake	5,155	4,502
Northern...	194	188
Tanga	1,622	1,806
Total ...	19,940	21,952

(b) *Wheat*

In the Northern Province, the main producing area, the crop suffered from widespread attack by rust as a result of dull and humid weather. The acreage planted was somewhat less than in 1950, owing to the expiry of a number of short-term leases to non-native farmers in the Mbulu District.

In the Southern Highlands Province the season was favourable, but the yields obtained by non-native farmers in past years discouraged extensive planting. Once again the harvests were small, averaging only two and a half bags per acre, and the decline in wheat growing by non-natives seems likely to continue. Native growers were sold three and a half tons of seed-wheat, and the variety B192 was reported to have yielded over six bags per acre in the Poroto area. The native wheat crops helped to ward off a serious food shortage. The following represents reported sales:—

Province	*Marketed Tonnage*		
	1950		1951
Northern...	7,475	...	4,636
Southern Highlands	361	...	380
Southern	203	...	542
Western	13	...	11 (Approx.)
Total ...	8,052	...	5,569

(c) *Maize, Sorghum and Millets*

Viewed generally, there was an excellent crop of maize, for the second year in succession. Over 6,000 tons were exported in 1951, and grain storage accommodation was fully utilized at the end of the year. Sorghums did not yield so heavily as usual and there was some decline in the planted acreage of this crop in favour of greater acreages of maize.

In the Northern Province 28,515 tons of maize were sold by the growers, an increase of nearly 5,000 tons over the 1950 figure and the highest recorded. Pink ear-rot and rat-damage were severe in many areas, but yields were, in general, very satisfactory.

In the Tanga Province the main maize-producing area is the Handeni District. A break in the rains early in the year, and other factors, resulted in a somewhat smaller acreage being planted, and rather lower yields being obtained, than in 1950. In addition to the 3,000 tons which reached the markets in 1951 it is estimated that a further 2,000 tons were still in the hands of the growers at the end of the year, largely for their own consumption. It is estimated that 5,000 acres of maize were planted by sisal and other estates, largely in the Tanga and Lushoto districts, but yields were not high and the produce was almost entirely used on the estates concerned.

In the Eastern Province yields were good, in spite of dry conditions at planting time and depredations by rats and field mice in the Morogoro District. It is satisfactory to record that sisal estates in the Province marketed 1,406 tons of maize surplus to their own requirements for rationed labour.

In the Southern Highlands the marketed tonnage of maize rose as compared with the previous year, this increase being largely due to the production in the Iringa District, where natives had excellent yields from hitherto uncropped land.

In the Southern Province maize sales fell, in the Western and Central provinces they rose, and from the Lake Province it is reported that in the main growing area of North Mara not only were sales heavy but there was also a tendency for maize to replace sorghums as the staple native food.

Sorghums and "bulrush" and "finger" millets, are very largely grown in the Lake, Southern, Eastern, Central and Western provinces, mainly for consumption by the native growers. White sorghum is purchased by the Department of Grain Storage at the same price as maize; the bulk of such purchases are in the Southern Province and the 1951 figures were similar (2,307 tons) to those of the previous season. Owing to excessive rainfall in most areas sorghum yields tended to be low, due to water-logging of the land both at sowing time and later. Delayed planting, engendered by the feeling of security following the good crops of 1950, was a contributory cause of these low yields.

The following table shows recorded sales of maize, sorghums, and millets of the 1950 and 1951 harvests:—

	1	2	3	4
Province	1951 *Maize Sales, Tons*	*Total* 1951 *Sales: Maize, Sorghums and Millets Tons*	1950 *Sales* 1950 *Maize Tons*	1950 *Maize, Sorghum and Millets Tons*
Northern	28,515	28,515	23,810	23,810
Tanga	3,180	3,180	5,585	5,585
Eastern	10,748	11,447	18,885	19,661
Central	513	646	3	3
Western	4,106	4,293	3,433	4,215
Lake	Not specified	5,016	Not specified	5,332
Southern	2,542	5,279	4,164	9,653
Southern Highlands ...	9,790	9,790	8,593	8,593
Totals ...	59,394	68,266	64,473	76,854

NOTE : (a) Figures in column 1 are included in column 2. Figures in column 3 are included in column 4.

(b) Production for sale by non-Africans is largely of *maize*, and the following figures for part of such production in 1951 are available (and are *included* in the above table) :

	Tons
Northern Province	
Arusha District	7,000
Moshi District	3,100
Eastern Province	
Morogoro District	1,770
Kilosa District	2,183
Mahenge District	35
Southern Highlands Province	549

COPRA

Generally, the fruiting of coconuts showed the effect which the severe drought of 1949/50 had upon the laying-down of the initial flowering tissues, and in the Eastern and Tanga provinces there was a marked decline in the production of copra. In the Southern Province, where the bulk of the coconut crop is normally consumed as fresh nuts, copra production showed little change. Weather conditions in the Tanga Province were unfavourable for the usual native sun-drying method of copra production, and from this and the Eastern Province it is reported that a dry spell in late 1950 affected yields. Increased sales of fresh nuts, sucking-bug (*Theraptus sp.*) damage, coconut beetle (*Oryctes monoceros*), neglected cultivation, and fires, were additional reasons for the

decrease in output. The following table shows the production of copra (in tons) over the last five years:—

Province	1947	1948	1949	1950	1951
Eastern	2,193	4,764	9,388	5,508	3,991
Tanga	2,684	2,879	5,147	4,557	3,518
Southern	571	625	1,751	943	1,076
Totals ...	5,448	8,259	16,286	11,008	8,585

Much teaching and propaganda was directed towards the sanitation and improvement of coconut groves, and the production of better copra. The Government coconut plantations near Tanga were undergoing a thorough cleaning up towards the end of the year.

A coconut-planting bonus scheme was introduced, to encourage an extension of coconut-growing in the coastal areas. The scheme provides for the payment of Shs. 1/50 per newly-planted palm, with further payments of fifty cents per surviving (or re-planted) palm at the end of the first, second, third and fourth years after the original planting. The minimum newly-planted area on which bonus may be claimed has been set at five acres, but smallholders may co-operate to secure the bonus. It was not expected that applicants would have sufficient seedlings to qualify for the bonus in 1951, and such was, indeed, the case, but a number of applications had been received before the end of the year. Payment of the bonus is made conditional upon the palms being planted in a proper manner.

The Gombero Coconut Scheme proved financially sound during the year. This scheme was handed over to the Native Authority as a going concern—having been originally established and run on an experimental basis by the Department. In brief, it consists of efficient copra drying kilns, built largely from local materials, erected in the centre of a productive area of African-owned coconuts, north-west of Tanga. High quality copra has been produced from nuts purchased from a large number of growers, the shells being used as fuel for the kilns. Attempts are now being made to form a Co-operative Society of growers to take over the kilns from the Native Authority.

Tea

There was increased interest in tea planting during the year, and many estates planned the planting of sizeable acreages during the next few years.

The production of tea during the last six years (in lbs.) was as follows:—

Province	1946	1947	1948	1949	1950	1951
Tanga ...	339,192	341,029	323,260	452,000	473,864	584,543
S. Highlands	1,141,727	1,028,280	1,168,149	1,001,132	1,274,808	1,762,848
Total	1,480,919	1,369,309	1,491,409	1,453,132	1,748,672	2,347,391

In the Southern Highlands and Western Usambaras the area of tea in actual leaf production remains at a total of around 8,000 acres, but recently matured areas in the Eastern Usambaras began, for the first time, to supply the modern factory which was recently completed there on the largest estate. Weather conditions were favourable for leaf production, and somewhat dry conditions in the Southern Highlands, during June, fortunately had little effect on the newly-planted areas. Valuable consignments of tea seed were exported from the Territory, mainly to estates in Kenya. The acreage planted to tea had reached nearly 10,000 by the end of the year.

Sugar

Sugar production by the only large estate in the Territory, at Arusha Chini in the Northern Province, was substantially higher than in previous years. The estate grows the varieties P.O.J.2878 and C.O.421, and plans to increase planting of the latter; sugar yields on the estate having averaged 3·3 tons per acre in recent years. Fertilizer trials with sulphate of ammonia show a significant increase in yield following applications at the rate of two cwt. per acre, and the optimum economic dressing would appear to be around this figure. The trials continue.

During the last six years the output of plantation white and brown sugar (in tons) from the factory at Arusha Chini was as follows:—

1946	...	...	...	...	7,600
1947	...	...	...	...	7,606
1948	...	...	...	...	6,066
1949	...	...	...	...	7,659
1950	...	...	...	...	8,055
1951	...	...	...	...	8,805

Sugar production elsewhere in the Territory is confined to the small-scale preparation of "jagree" by the simple method of evaporating juice in open pans. An interesting venture of this kind in the Bukoba District, which was intended by its owner to demonstrate the cultivation of cane on the peaty deposits of an old lake bed, has not progressed beyond the stage at which "jagree" is produced.

Tobacco

The commercial production of flue-cured tobacco is at present confined to the Iringa area of the Southern Highlands Province, where Ehlers continues to be the chosen variety. Production reached 1,325 tons as compared with 1,200 tons the previous year. The season was a favourable one for the crop, apart from a delay in the break of the rains resulting in planting having to be carried out over a short period, with consequent pressure of work at picking time. The handling, grading and picking of the 1951 crop at the sheds of the Southern Highlands Non-Native Tobacco Growers' Union has been under close supervision, and the output, which is being marketed on a commission basis by a well-known firm of brokers, is expected to be of good quality. The Mgwina and Tunduru areas of the Southern Province may prove suitable for the production of flue-cured tobacco, and officers of the Department have continued their investigations. Early reports on small samples from trial plots at Mgwina are promising, and trials continued with the varieties C.7, Gold Dollar, and Harrison Special.

The areas of Songea (Southern Province) and Nyamirembe (Lake Province) produce fire-cured tobacco. The Songea crop fell to around half that of the record crop of the previous year. A new and enlarged processing plant has been erected, and the 1951 crop has every chance of being a profitable one, the quality of the leaf being reported to be high.

In Biharamulo there was a twenty-three per cent increase in the number of growers and production rose to a record figure. The produce of this area is readily absorbed by the cigarette manufacturers of neighbouring Kampala, and the new grading floor, which was opened in 1950, enabled the crop to be

handled efficiently. The proximity of the final manufacturer is an advantage to the Nyamirembe tobacco growers, who have not yet found it necessary to establish themselves on the United Kingdom market in the manner which has been the policy of the Ngoni-Matengo Native Co-operative Union in Songea for many years.

Tobacco is grown in small quantities on native holdings in many areas of the Territory. The prepared product ranges from rolled air-dried leaf which is marketed in limited quantities on the East African coast, to snuffs and cake tobacco (the latter made from the macerated and fermented green leaf) which have a very localized sale. Reliable production figures regarding this tobacco, which is grown in patches of a few dozen plants, are not available. High-nicotine tobacco (for the insecticide industry) is still grown on a small scale in the Southern Highlands, but has not proved a profitable crop.

The following table summarizes tobacco production (in lb.) during the last five years, in the main producing areas:—

Area	1947	1948	1949	1950	1951
			Flue-cured Tobacco		
Iringa	749,389	1,901,385	1,710,816	2,863,085	2,968,000 (Approx.)
			Fire-cured Tobacco		
Area					
Songea	389,740	1,341,760	1,989,120	2,856,000	1,352,960 (Approx.)
Nyamirembe ...	179,250	291,200	321,942	407,644	470,400 (Approx.)
	568,990	1,632,960	2,311,062	3,263,644	1,823,360

Pyrethrum

In the Northern Province there was a slight fall in production, and the pyrethrin content of much of the crop was below normal. It would appear that the weather—so frequently humid and overcast—did not suit pyrethrum. Increased plantings took place, both in the newly-opened areas on Mount Meru and elsewhere.

In the Southern Highlands production rose, and, as far as supplies of planting material permitted, the acreage under pyrethrum was extended.

The following table indicates production (in tons) during the last five years:—

Province	1947	1948	1949	1950	1951
Northern	204	101	91	144	136
Southern Highlands ...	303	149	168	149	165
Totals ...	507	250	259	293	301

Southern Highlands growers, working in conjunction with the Department's Agricultural Officer (Experiments), have carried out a notable programme of trials on their own farms. Their findings are already entering current practice, and the "placement" of phosphate, proved so advantageous in previous years, is now a routine on most farms. The first beginnings of pyrethrum growing by natives received encouragement and guidance.

There were no signs of the synthetics ousting natural pyrethrins from their position—the demand for pyrethrum far exceeds the supply, but the price of the extract still compares favourably with that of the synthetics. A sensible sales policy, in a time of potential high prices, is largely responsible for this situation.

Papain

The revival of interest in planting, which occurred in 1950 and continued during the year under review, resulted in an estimated 3,000 acres of papaw by the end of 1951. Papain production rose, and although no more than 20,504 lb. was actually railed from the main centre (Arusha) during the year there were all indications that this figure would be greatly exceeded in 1952. The price rose sharply to around Shs. 38/- per lb. at the end of 1951. Efforts were made to encourage growers to form an Association and take measures to maintain the quality of their product, but by the year-end no such Association had been formed.

Seeds

Yields during the 1950/51 season were somewhat low, but the quality was good. The 1951/52 season's crop is expected to reach 1,600 tons, of which it is estimated fifty per cent will be sold to the United Kingdom, twenty-five per cent to Australia, twelve per cent to Canada, eight per cent to South Africa, and the remaining five per cent to New Zealand, France, and Switzerland.

In view of the outbreak of a bacterial blight of peas it is considered that little pea-seed will be grown in the Northern Province in the future. Since the disease has also occurred in other parts of the Territory it is unlikely that alternative production areas can be developed. Seed-bean growing remains the chief activity.

Production during the last four seasons (in tons) was as follows:—

Province	1948/49	1949/50	1950/51	1951/52
Northern	1,655 ...	1,401 ...	1,173 ...	1,600 (estimated)

Onions

From the principal growing areas there are reports of thrips damage, and difficulty in ripening-off the crop, as a result of unfavourable weather. Prices as low as twenty-five cents a kilo, to the grower, were reported from some areas. A considerable proportion of the crop is sold otherwise than through regular markets and the figures given below do not represent total production. The crop was grown largely from seed imported by the Department of Agriculture from India.

Province	*Marketed Tonnage*				
	1947	1948	1949	1950	1951
Northern	1,958 ...	2,085 ...	2,191 ...	1,320 ...	1,265
Eastern	89 ...	119 ...	150 ...	263 ...	174
Central	— ...	297 ...	158 ...	640 ...	924
Lake	— ...	— ...	144 ...	148 ...	38
	2,047 ...	2,501 ...	2,643 ...	2,371 ...	2,401

Cassava

The acreage of cassava in the Territory has now been brought up to a figure which should afford fairly substantial reserves of food in the event of a grain-crop failure.

The threat of locust invasion, present throughout the year, was an added stimulus to root-crop cultivation. The situation in the provinces is summarized below:—

Province:

Central: There was a campaign to increase the acreage of cassava, and this met with very substantial success.

Eastern: Planting was considerable in Kisarawe, Rufiji, Morogoro, and parts of Bagamoyo districts. It was inadequate in Kilosa District, and the Uzigua chiefdom of Bagamoyo. Dry root sales were confined to Morogoro District.

Western: Natives required surprisingly little encouragement to increase their acreages, due, no doubt, to their appreciation of the importance of the crop after the 1949 drought.

Southern: The encouragement of planting in the 1949/50 seasons has resulted in a large tonnage of dry root being marketed and exported.

Southern Highlands: Increased acreages of cassava were planted.

Tanga: On the coast the seasonal planting campaign was carried out with fair success, but it was necessary for some natives to be prosecuted by the responsible authority for failure to grow the prescribed acreage. Some losses were reported, due to flooding. In the Handeni District the system of communally-grouped cassava plots, much used on the coast, has been introduced. In the plains and foothills of the Lushoto District planting campaigns, associated with a survey, resulted in increased acreages. There has been insufficient planting in the Pare District.

Northern: Only in the Moshi District has there been any increase in cultivation. Little cassava is grown in this important maize-growing Province.

Lake: A small tonnage was marketed from Ukerewe.

Province	*Marketed Tonnage of Dried Root*		
	1949	1950	1951
Southern	6,041	1,252	8,894
Western	2,380	1,751	2,540
Eastern	523	19	112
Central	—	—	31
Lake	256	30	17
	9,200	3,052	11,594

The table of marketed tonnage, given above, shows very clearly how the native cultivator turned to cassava as a very substantial addition to his diet when the effects of the poor grain harvests of 1949 were being felt, while in 1951—the second year in succession of adequate grain harvests—the crop was a useful source of cash.

Many of the mosaic-resistant varieties issued by the East African Agricultural and Forestry Research Organization are now under local trial in the districts. A number have yielded heavily, but reports have been received that they are more susceptible to attack by pests and vermin than are the bitter sorts such as "Liongo". This susceptibility of the "sweet" cassavas is, of course, well known, and the next step would appear to be to attempt the addition of mosaic-resistance to the useful characteristics of the bitter types.

Pulse Crops

As a result of the shortage of mixed beans for rationed labourers, reported after the 1950 harvests, the price to the cultivator was raised in 1951. This was followed by an increase in the marketed tonnage which was somewhat embarrassing, as the world price of beans of this quality was not sufficiently high to permit profitable export. The surplus beyond the Territory's needs was exported at a loss. The total marketed pulse crop exceeded that of 1950 by some 10,000 tons. A record tonnage of haricot and bonavist beans was marketed in the Arusha District, and very substantial tonnages of haricots, mixed beans, cowpeas, pigeon peas, field peas, and grams were marketed in the Moshi District. The climatic conditions were certainly not ideal and the quantities sold must have been due, in part, to the attraction of the price.

In the Southern Highlands Province, where field peas are a popular crop, the total marketed tonnage of pulses was seven times greater than in 1950, and both here and in the Western Province favourable weather assisted growers. Production in the Lake Province (where soya beans are normally grown on a considerable scale in the Bukoba District) was disappointingly low. In the Tanga Province the short rains crops were more successful than those planted, as is the custom, when the main rains normally slacken, owing to heavy falls late in the main rains season.

Marketed tonnage of Pulses

ANALYSIS

Province	*Total Pulses*	*Mixed Beans*	*Haricot Beans*	*Soya Beans*	*Chickpea*	*Cowpea*	*Pigeon Pea*	*Grams*	*Other*
Lake ...	7,346	3,880	—	474	2,668	300	—	—	24
Northern ...	8,530(a)	—	— Not specified		—	—	—	—	—
Northern ...	1,647	831	816	—	—	—	—	—	—
S. Highlands	2,132(b)	—	— Not specified		—	—	—	—	—
Western ...	2,061	1,515	—	—	82	203	210	51	—
Eastern ...	635	215	—	—	—	99	257	64	—
Central ...	176	34	—	—	—	142	—	—	—
Southern ...	1,833	—	— Not specified		—	—	—	—	—
Total ...	24,360(c)								

Note : (a) The 8,530 tons of pulses forming part of the production of the Northern Province consisted largely of haricots, the remainder bonavist beans, field peas, cowpeas, pigeon peas, and grams.

(b) Production in the Southern Highlands Province was partly of field peas.

(c) Total marketings of pulses in 1950 amounted to 14,155 tons.

(d) Groundnuts and bambarra nuts are not classified as pulses.

The occurrence of a bacterial blight of peas in the Northern Province, followed by outbreaks on garden peas elsewhere in the Territory, may have a serious effect on field-pea (and seed-pea) production in the Territory. Fortunately the disease does not appear to attack other food pulses.

Castor Seed

The price to the grower (or collector) of this oil seed ranged from £68 to £100 per ton. In the Eastern Province, the acreage of castor increased, but the yield per acre was noticeably lower than in the previous year. In all other areas where castor was grown last year the 1951 marketed tonnage showed a considerable increase over 1950 figures, and castor cultivation is extending in many parts of the Territory. Castor was grown by non-native estates in the Southern Highlands and Central provinces.

	Marketed Tonnage		
Province	1949	1950	1951
Eastern	690	1,046	820
Central	333	652	1,621
Southern	54	151	374
Southern Highlands ...	—	—	600
Tanga	—	111	400
Northern	—	30	100
Western	—	—	10
Totals ...	1,077(a)	1,990(a)	3,925

(a) Revised total.

In the Central, Eastern, Northern and Tanga provinces the further expansion of castor growing may have an adverse effect on food production, and, in the Eastern Province in particular, on cotton production. In the Handeni District of the Tanga Province the Native Authority ruled that castor should not be planted among food crops.

The seed is exported for overseas milling, and is an important raw material of the plastics and nylon industries.

Cashewnuts

Production, which has increased in recent years, showed a further rise in the Southern Province, and remained at about the 1950 figure in the Eastern Province. Good prices continued, but it is understood that the ungraded produce of Tanganyika sells at some twenty to twenty-five per cent less than the better quality product of neighbouring territories. The nuts are shipped to India as harvested. After shelling, processing, and packing, the kernels are, to a great extent, sold to the United States of America. In the Southern Province interest among non-native growers, small in number at present, is now growing. Inquiries have been received concerning the possible erection of a shelling, processing and packing station. Increased planting by native growers is reported from the coastal districts.

	Recorded sales by growers (in tons)				
Province	1947	1948	1949	1950	1951
Eastern	348	661	444	1,117	1,073
Southern	1,312	4,533	3,276	4,787	5,308
	1,660	5,194	3,720(a)	5,904	6,381

(a) A year of low rainfall resulted in poor crops.

MINOR CROPS

Cinchona

Production in 1951 totalled forty-two tons of bark, and 750 lb. of "Totaquina" tablets were manufactured on the estate which is equipped with a factory. The crop, grown on seven estates in the Usambaras, does not appear to be particularly profitable at present.

Derris Root

Cultivation is declining. A number of the estates in the Usambaras which grew the crop in the past are now concentrating on tea.

Essential Oils

Interest in lavender and geranium oil production continues in the Southern Highlands Province. There is one producer of bitter-orange oil in the foothills of the Eastern Usambaras. Essential oil production in the Northern Province appears to be declining. Exports from the Territory were as follows:

Essential Oil Exports (in Lb.)

	1948	1949	1950	1951
Lemon-grass Oil	24,725	8,683	1,543	3,905
Geranium Oil	—	550	75	36
Bitter Orange Oil	2,592	4,392	18,828	9,432
Others	167	101	1,539	695

Spices

Chillie production in the Northern Province rose from seven tons in 1950 to thirty-eight tons during the year under review, in response to the high prices prevailing. Small quantities of pepper and nutmegs are grown in a high-rainfall area of the Eastern Usambara foothills.

Palm Oil

The price to the producer, for kernels, averaged nearly twice that which prevailed during 1950 in the Kigoma area, largely owing to new buyers entering the market. These higher prices resulted in heavier marketing of the kernels. There was only a small increase in the recorded sale of red palm oil, this derivative of the fruit being largely retained for home consumption and for sale other than at the markets. Further progress with plant sanitation was achieved, but owing to the scattered distribution of the palms it is up-hill work.

Some of the palms raised from seed of Belgian Congo origin are now coming into bearing at Kigoma and crop records will be kept of these and of thin-shelled and thick-shelled local types.

In the Tanga Province, where there are some 600 acres of oil palms on sisal estates, some twenty-five tons of pericarp oil were produced for consumption by estate labourers. Fourteen tons of kernels were exported.

The following table shows the recorded marketed tonnage of pericarp oil and kernels from palms in the Kigoma area:—

	1947	1948	1949	1950	1951
Palm kernels	207	263	239	224	370
Pericarp oil	34·4	11·9	26	56·3	60·4

Tung Oil

The crop is falling out of cultivation in the Usambaras, owing to the insufficient financial return. Trials in the Southern Highlands have not yet reached the stage where the suitability of the crop can be assessed. The declining interest in neighbouring territories would appear to indicate that profitable production is unlikely.

Cacao

One estate in the Tanga Province produces a very small tonnage each year.

Kapok

Good prices were obtained and more attention was paid to the upkeep of plantations, many of which had suffered from neglect in the past. The following table shows the export tonnage during recent years. Production in the Eastern Province averages around 200 tons per annum, and in the Tanga Province exceeds 100 tons per annum. No extensive new plantings have been reported. Exports do not relate closely to production owing to a tendency for harvests to be held for a rise in price. The following table shows the export tonnage in recent years:—

1950...	653
1951...	381

Beeswax and Honey

The export price of beeswax continued to rise during the early months of the year, reaching a peak of £750 per ton in early March. The price then declined to around £500 at the end of April and fluctuated around that figure for the remainder of the year. The report of the Beeswax Officer, which is appended, contains detailed comments on aspects of beeswax and honey production. The table of exports given below represents, for beeswax, the bulk of the tonnage collected. Honey, however, is very largely used in the Territory for the brewing of native beer, and there are no records of the quantities used for this purpose.

	1947	1948	1949	1950	1951
Beeswax	410	905	525	315	673
Honey	118	238	37	1	–

Gums (Arabic and Copal)

The collection of gum, always from naturally occurring trees, is an occupation which appears to be resorted to most extensively when, owing to partial crop failures, there is a temporary shortage of food and the money with which to purchase it. The large tonnage collected in 1950 was the result of such shortages occurring after the 1949 crop-season. Collection in 1951 was on a much smaller scale.

Recorded sales by collections (in tons)

Province	1949	1950	1951
Central	115	265	85
Eastern	36	68	16·5
Lake	272	614	245
Western	275·6	683·8	228·3
Southern	21	23	5
Total ...	719·6	1,653·8	579·8

Rubber

Production of Para rubber (*Hevea braziliensis*) at Sanje Estate in the Eastern Province amounted to twenty-eight tons, as compared with forty-five, fifty, thirty-five and twenty-five tons in 1947, 1948, 1949 and 1950 respectively. Twenty-eight acres of *Hevea braziliensis* were planted in connection with the Uluguru Land Usage Scheme.

Some tapping of Ceara rubber which occurred in 1950 on a small scale, continued during 1951. No figures are available. Considerable acreages of abandoned Ceara rubber trees were cleared to make way for sisal and native crops, and there were no indications at all of any real revival of interest in Ceara rubber.

Betel Nut

The crop, grown near Pangani in the Tanga Province, was a particularly good one. The recorded exports quoted below do not represent total production—much of the crop being moved by unrecorded road transport:—

	Exports (in tons)
1947...	62
1948...	68
1949...	66
1950...	60
1951...	71

Sweet Potatoes

The shortage of planting material, reported last year, was largely overcome during 1951. The crop is grown throughout the Territory, but is very seldom bought in bulk at native markets (as are, for example, dried cassava, grain, pulses, etc.). Quantities surplus to growers' own needs are often sold in small lots of a few pounds at a time, or bartered for grain, etc. In the Western Usambaras, Mbulu district and Southern Highlands, the crop is of particular importance as at the higher altitudes it replaces cassava as a food-reserve available in the event of grain-crop failure or locust attack. Sweet potatoes, in some dozens of varieties, are grown as both irrigated and unirrigated crops by natives and are the recommended first crop on newly-formed "Hehe" ridges containing a large core of unrotted organic matter. They are grown to some extent by non-native farmers for pig food. Yields were good during 1951, as a result of adequate rains.

European Potatoes

In the Southern Highlands good crops of high-grade potatoes were produced in the Mbeya and Iringa districts. In the Usambaras Late Blight was severe but local needs were met and very limited quantities were railed down the Tanga Line. In the Southern Province the supply did not meet the demand and potatoes were imported from Kenya. In the Northern Province supplies were short.

The trial of potato varieties, imported from the Scottish Society for Research in Plant Breeding, continued at Lushoto, and one promising variety

imported in 1949 remained immune to Late Blight and yielded satisfactorily. Another, though not immune, yielded heavily.

Vegetables

In the Southern Highlands production met the local demand, and there was a small export trade to Dar es Salaam and the Central Province. In the Morogoro District production fell owing to a consignment of poor quality seed and marketing difficulties, but prospects for the coming year are considerably better. In the Usambaras production remained at about the same level as in previous years. The European cabbage is now a regular item of native diet in the Usambaras and a very large tonnage is grown both from seed and rooted stump-shoots—the use of the latter as a means of propagation being an interesting, if not very wise, economy. Varying arrangements were made in the different areas to enable native growers to purchase good quality seed, one such, in the Usambaras, being that the Native Authority purchased packeted seed from South Africa and sold it to individuals and small retailers on a non-profit basis. The varieties were chosen by the Agricultural Officer, who also kept a check on germination-rate and trueness to description.

Fruit

Citrus Fruit: In the main growing area of Muheza (in the Tanga Province) the main crop was a virtual failure, following the exceptionally heavy "fly" crop of 1950. The 1951 "fly" crop was by no means large, and the year's total came to about a third of the average. The packing and juicing plant which purchases the bulk of the crop operated at a substantial loss; its capacity is such that several tons of fruit had to be discarded even in this year of small intake. Fruit was bought from the native growers at Shs. 17/56 per 1,000, an increase of twenty cents over the 1950 price.

Tonnage of citrus purchased at Muheza

1947...	793
1948...	1,546
1949...	1,204
1950...	1,780
1951...	422

Miscellaneous Fruit: Some 35,000 lb. of passion fruit were processed by Tanganyika Passion Fruit Limited's small factory at Lushoto, the bottled juice being marketed in the territory and abroad. Some 5,000 lb. of the fruit were purchased from native growers at fifteen cents a pound, but this price did not stimulate production. The acreage of passion fruit on the company's estate was reduced, as yields on certain blocks were uneconomic.

In the Tanga Province the export trade in bananas (to Zanzibar) was slightly smaller than last year, and yields of other fruit were below average. Small quantities of peaches, plums, strawberries, etc., were, as usual, sent from the Usambaras to Tanga.

New plantings on a garden scale were reported from the Southern Highlands, but the transport difficulty continues to be a serious problem for the growers of all perishable produce in that area. Much fruit is wasted each year.

SECTION II.—WORK OF THE DEPARTMENT OF AGRICULTURE AND PROGRESS OF FIELD EXTENSION ACTIVITIES

Finance—Expenditure

The following is the actual expenditure incurred in 1951:—

	£
Personal Emoluments ...	148,649
Other Charges	153,089
Special Expenditure	28,057
Total ...	329,795

In addition to the above, one project was financed from Colonial Development and Welfare Scheme, viz.: Soil Conservation, and expenditure on this item in 1951 was as follows:—

	£
Personal Emoluments ...	7,905
Other Charges	16,772
Capital	3,594
Total ...	28,271

Staff—European

The Director assumed the office of Acting Member for Agriculture and Natural Resources for nine months during the year. During this period the Deputy Director took over charge of the Department.

The establishment of Senior Agricultural Officers and Agricultural Officers for 1951 was fifty. The reduction resulted from the creation of the new post of Chief Soil Conservation Officer. This post was filled by promotion from the establishment of Agricultural Officers.

Two Agricultural Officers retired during the year, two were transferred to other Colonies and nine were appointed and assumed duty. At the end of the year the Department was still fourteen under establishment. As against this four new appointments have been promised for 1952 and one for 1953, four men are now undergoing post graduate training and two men are to be posted in 1952 for one year before proceeding to Trinidad. This will partially relieve the shortage, but taking into account only retirements known to be imminent there cannot be less than ten vacancies by 1954. Even at its present strength the Department is short of experienced officers to fill responsible senior posts since there are few who have served more than two and a half tours.

The post of Superintendent of Agriculture with an establishment of two was created and the two Senior Agricultural Assistants were promoted to fill the vacancies. These posts were introduced to provide for the promotion of a limited number of Agricultural Assistants who had reached the maximum of their salary scale and who had done outstanding work while serving as Agricultural Assistants.

The establishment of Agricultural Assistants for 1951 was ninety-three. By the end of the year with seventeen new officers appointed, four casualties and one Assistant promoted to Agricultural Officer after successfully completing a Nuffield Foundation Scholarship, the Department was still thirteen under establishment.

On the specialist side the following posts were filled:—

1 Entomologist.
1 Entomologist's Assistant.
1 Fisheries Officer.

Vacancies unfilled included:—

1 Entomologist.
1 Fisheries Officer.
1 Botanist.

Additional vacancies filled during the year included a Secretary for the Headquarters office and one for the Lake Province Cotton Committee, a Tobacco Officer, a Stenographer and two Soil Conservation Officers.

Two of the three posts of Junior Agricultural Assistants were filled. These posts have been created to provide an opportunity for sons of local European residents to gain experience in agriculture with a view to entering the permanent service later.

Staff—Non-European

The recruitment of competent and reliable clerks continues to present a serious problem, and too much of the time of highly-trained officers is therefore still spent on routine matters to the detriment of field work. Ten vacancies remained at the end of the year in the Executive Grade establishment.

The Clerical Staff consisted of:—

13 Executive Division.
45 General Division.
36 Subordinate Service.
5 Temporary Clerks.

The Field Staff included:—

6 African Agricultural Assistants (one vacancy).
9 Coffee Grading Assistants.
96 Recorders.
28 Artisans.
253 Instructors, Junior Service.
552 Instructors, Subordinate Service.
483 Instructors, Food Production Staff.
34 Instructors, Copra Industry.
60 Overseers.
76 Motor Drivers.
6 Teachers (8 vacancies).
5 Surveyors.
102 Instructors on Probation.
1 Mechanic.
1 Industrial Instructor.

It should be noted that one African Agricultural Assistant was selected for a UNESCO Fellowship for Conservation of Natural Resources and visited the United States of America.

The increase in the Junior Service grade of Agricultural Instructors resulted from the promotion to the Junior Service of men who had previously been appointed to the Subordinate Service on leaving the Ukiriguru School. This

accounts for the decrease in number of Subordinate Service Agricultural Instructors.

The staffing of mechanized schemes and the increase in the number of drivers attached to the Soil Conservation Service accounts for the additional Motor Drivers.

Provincial Summaries

Eastern and Central Provinces

The notable features of the year in the Eastern Province included the record paddy crop of over nine thousand tons—of which nearly seven thousand came from the Rufiji area; the excellent maize crops in Kilosa, Morogoro, Mahenge, and Rufiji districts; the greatly increased demand for tractor ploughing in the Rufiji District following the successful ploughing of 3,000 acres for the season's cropping; the progress made by the smaller ploughing schemes and by the Uluguru Land Usage Scheme; the start of the Kilangali Pilot Irrigation Scheme, and the increase in the area under cassava in the Kisarawe District. The cotton crop was disappointing due very largely to pest damage and the preoccupation of native growers with such profitable and easily grown cash crops as castor and sunflower.

In the Central Province yields were average or slightly above average. The groundnut crop appeared to be regaining its former popularity, and good progress was made with increasing the acreages of cassava and sweet potatoes. Water supplies and soil conservation measures were improved, and there were substantial stores of grain in the 171 silos at the end of the year. Castor cultivation more than doubled, and may have to be controlled in some areas in order to maintain food-crops production. Castor (and beeswax) did, however, add very substantially to the income of the people, the return from these and all other cash crops having been calculated to have averaged according to district, from Shs. 12/- to Shs. 178/- per taxpayer, the Provincial average being put at Shs. 25/- compared with last year's figure of Shs. 8/-.

Western Province

Crops were good, apart from sorghum, and in addition it is satisfactory to record that food-crop acreages showed a substantial increase. Only very local food shortages occurred, and these were mainly in the fishing villages of the Kigoma District. Maize acreages increased at the expense of sorghums, no doubt as a result of the good crops obtained in 1950. Marketed tonnages increased very satisfactorily, notably of groundnuts. Stalk borer caused substantial losses, and so did rats. Swamp-draining continued, and rice dams were repaired.

Lake Province

The Province had an average season, the marketed tonnage of crops exceeding last year's figures by 8,000 tons. The cotton crop was to a great extent late-planted, and a season which might otherwise have been a very successful one resulted in a crop little better than that of 1949/50. As in other provinces, sorghum yields were generally low but good maize crops were harvested. The coffee crop totalled nearly 10,000 tons and the acreages of tobacco, beans, and groundnuts were increased. In spite of another season of good growing conditions for paddy the marketed tonnage showed a decrease. A certain

lethargy prevailed, as a result of the good harvests of the 1949/50 season, and perhaps due to there being little incentive to earn still more money. There were exceptions however such as Chief Majibere of Maswa District who ploughed thirty acres with a Ferguson tractor and 18,000 cultivators who have bought ox-ploughs together with a number who have purchased ox-carts.

The Sukumaland Development Team has more than proved its worth during the year, and there was general acceptance of the land usage area concept, with its accompanying Parish and Area Councils, as a fundamental basis to proper organization of the use of the land.

Northern Province

The highlight of the year was the record tonnage of maize sold by native and non-native growers. The ample and well-distributed rains suited this crop, but the same cannot be said for wheat—which suffered severely from rust as the result of prolonged periods of humidity. Despite a somewhat unfavourable season for beans and pulses, record tonnages reached the markets, probably due as much to the increase in the price to the grower as to unusually heavy yields. Seed-bean harvests were up to average, but the seed-growers suffered a blow when a hitherto unrecorded bacterial disease of peas caused severe damage where the outbreak occurred. An excellent crop of coffee was being harvested at the close of the year, but, for sundry reasons, a considerable proportion will be delivered in the form of dried cherry ("buni") rather than in the higher quality parchment form.

The first recorded outbreak of Panama Disease (*Fusarium oxysporum var. cubense*) has created a serious danger to the banana crop of Moshi District where this crop is a staple food of major importance.

Tanga Province

On the whole it was a good crop year, though the late start of the main rains, and the heavy falls concentrated in April and May, resulted in some poor yields from February sowings in the Handeni and Same districts and losses due to floods in the coastal areas.

The Province supports a very large labour force and a considerable urban population. The sisal industry alone employs well over 60,000 men and their dependants and the growing tea industry supports some thousands of workers and their families. Food-crop production by sisal estates has been less than in former years whilst the land held by tea estates includes little which is suitable for food growing. The Handeni District has been the "granary" of the Province since 1947—apart from the crop failure of 1949—and in 1951 the district marketed 3,000 tons of grain besides increasing its own reserves. This harvest, though smaller than that of 1950, went far towards meeting the needs of estate labour and the urban population. One thousand, eight hundred tons of rice were marketed in the Lushoto and Pare districts, cultivation of this crop having increased somewhat in the Lushoto District as a result of propaganda. Cassava planting in the Tanga, Handeni, and Lushoto (plains and foothills), districts was encouraged with some success, but was insufficient in the Pare District. Bean, copra, and citrus crops were small in 1951—the latter not unexpected after a record 1950 orange crop, followed by a long dry spell. Castor seed collection is on the increase in the Handeni District, and

new plantings of Arabica coffee were made by natives in the Usambaras and Pares—who harvested a good crop. Cotton production showed no increase, although a greater acreage was planted in the Pare District.

The sisal industry of the Province accounted for some sixty per cent of the Territory's fibre and tow production, new acreages of tea were planted in the Usambaras, and the new tea factory in the Eastern Usambaras started work.

Southern Highlands Province

Apart from certain areas in the Rungwe and Iringa districts rainfall was abundant and reasonably well distributed. In the Poroto mountains, and around Mbosi, overcast weather made weed control difficult. Apart from paddy, marketed tonnages of food-crops and the majority of cash crops showed substantial increases as compared with 1950.

There was increased planting of coffee in the Mbosi area, but production in the Rungwe District declined.

Tea, pyrethrum, flue-cured tobacco, and fruits and vegetables, yielded well on the non-native estates, and weather conditions were favourable for the wheat crop.

The Agricultural Officer (Experiments) continued a series of very informative trials in connection with the manuring of wheat, pyrethrum, and tobacco, and wheat and tobacco variety trials. A feature of the work on pyrethrum was the willing and highly effective co-operation of the non-native growers—much of the work being, in fact, carried out by the growers themselves.

Some 500 light ox-drawn ploughs were purchased by natives of the Iringa and Njombe districts alone, and one native bought a heavy tractor and plough. Increased quantities of manure were got onto the fields for the 1951-52 crop, and ox-drawn carts were in use in some instances for this work.

Southern Province

The marketed tonnage of maize and sorghum was little more than half that of 1950. Three thousand, seven hundred tons of maize were imported from elsewhere in the Territory to meet local shortages after the 1951 harvests. Shortages which occurred prior to the harvest were met by internal movement of grains. The marketed tonnage of pulses was also well below the 1950 figure.

Somewhat erratic rains, an increased acreage of cash crops, and a large acreage of matured cassava, were among the reasons for a reduction in the tonnage of grains (other than paddy) and pulses which reached the markets. Sales of dried cassava reached nearly 9,000 tons, as a result of the increased plantings which were encouraged in 1949 and 1950.

Cashewnuts, sesame, and castor, were produced in considerably greater quantity than the previous year, as were a number of minor cash crops. The Songea tobacco crop was little more than half that of 1950, this being attributed more to a decrease in the planted area than to particularly low yields. Reduced plantings of tobacco are thought to have been due to the growers' reaction to the effect of processing losses on the payments made for the 1950 Songea crop.

AGRICULTURAL STATIONS AND EXPERIMENTAL WORK

The Coffee Research Station, Lyamungu

Somewhat dry conditions in late 1950, followed by good rains in mid-January, and again in February, resulted in two very heavy flowerings. There was a heavy set of cherry and a strong flush of vegetative growth. Some cherry fell in March, but heavy rains in April and May, followed by light showers well into August, carried a good crop through to harvest. Sunny spells in July and August resulted in a crop which ripened from a month to six weeks earlier than usual, and the heavy rain of November—though helpful to the last of the maturing cherry—hampered the drying of the crop already picked. In December, 1951, there was sufficient rain to bring out small flowerings and swell some very small flower bud.

From an area of 126½ acres in cropping, including nine acres in their first bearing year, the Research Station had harvested some eighty-three tons of parchment coffee—with an estimated five tons yet to be picked—by the end of December.

A Summary of the Senior Research Officer's Annual Report is printed in the Reports of Technical Officers and Specialists. Three new experiments and six new off-station trials were planted. The experiments are designed to shed further light on the relative yields of seedling and vegetatively propagated trees, on the suitability of certain selections to the single and multiple stem systems of pruning, and on the effect (on yield) of modifications of these two systems.

Existing experiments are tending to indicate that vegetatively propagated trees (of high-yielding clones) do not, in the long run, yield more heavily than seedlings from selected mother-trees, and that there is as little tree-to-tree variation between seedlings as between trees of a clone.

It was confirmed during the year that the following cultural methods result in heavier cropping:—

(a) Banana-trash as mulch at forty lb. per tree;
(b) Irrigation to the extent of making up the rainfall to two inches monthly;
(c) A combination of (a) and (b);
(d) Compost at the rate of one four-gallon tin per tree;
(e) Pruning on the multiple stem system.

There are indications that the response to these treatments may vary according to clone. The use of Giant Cynodon and Guinea grasses as substitutes for banana-trash and of farm-yard manure instead of compost, are under investigation.

Preparations continued for future coffee-planting on the Lyamungu Estate; some 13,000 cuttings were rooted during the year. The forty-three cows yielded over 6,000 gallons of milk, and the policy of culling all cows producing less than 200 gallons in any lactation was continued.

Mbosi Coffee Sub-Station, Southern Highlands Province

The three main trials were maintained. These are designed to provide information on the spacing, varieties, and methods of establishment most suitable for the area. A small green-house for trials with young coffee grown at

controlled temperatures was brought into use in July, the green-house plantings being replicated in the nursery under natural conditions. Dry-bulb and Wet-bulb thermometers were installed in the green-house, and in an outside screen, in November.

The "black-tip" (or "wither-tip") disorder is receiving particular attention at Mbosi, and an attempt was made to determine, by means of field plots of plant indicators, what minor element deficiencies occur in the local soil—but the results were inconclusive. The new green-house will assist in these investigations. The Government Chemist has co-operated, by carrying out analyses and advising on the use of the solid-injection method of diagnosis.

Small observation plots of Niger Oilseed, Tropical Kudzu, Buckwheat, and lettuce varieties, were planted.

Sisal Experimental Station, Mlingano, Ngomeni

The Station continued under the control of the Tanganyika Sisal Growers' Association, by whom it is financed, policy being the concern of a Research and Management Committee of the Sisal Board. The Senior Research Officer in charge, a Plant Physiologist, and two Agricultural Assistants, are seconded to the Station by the Department of Agriculture. A Soil Chemist was appointed to the Station during the year.

The new laboratories were equipped during the year with modern apparatus, and arrangements were made for the addition of spectrographic equipment in 1952.

Part I of the Senior Research Officer's Annual Report is printed in the Reports of Technical Officers and Specialists and the full report is published separately by the Tanganyika Sisal Growers' Association.

At the present time the main work of the Station is the investigation of problems related to the maintenance of soil fertility and the nutrition of the sisal plant. The addition of a Soil Chemist to the staff now permits more extensive study of the principal soil types on which sisal is grown.

Thirty-five field trials on and off the Station, are concerned with the effects of clean weeding, cover crops, mulching, the trimming of transplants, plant density, the frequency of cutting, rotations with grass leys, applications of nitrogen, phosphate, potash and lime, fertilizer placement, ridge cultivation, interplanting with food crops, the manuring of bulbil nurseries with fresh and old sisal waste, and the value of certain Agave hybrids.

The Plant Physiologist, apart from work on the factorial manurial trial, has been concerned with the sand culture of sisal, injection techniques in connection with the identification of deficiencies, the trial of growth-promoting substances, transpiration measurement, and the study of excised sisal tissue in nutrients.

Results in recent years have confirmed the undesirability of clean weeding and premature cutting, and the advantages to be derived from manuring bulbil nurseries with sisal waste. There are indications that distances between rows, and cutting cycles, are not vital factors as regards yield. The factorial manurial trial is now throwing light on the nutritional requirements of sisal but several years must elapse before conclusive results are available.

Scientific workers of a private firm investigating control measures for the sisal weevil were accommodated on the Station; the investigation of sisal bole-rot continued; fibre tests were carried out; new types of land-clearing and mulch-producing implements were tested. Nearly 9,000 citrus trees were sold at a nominal price to encourage the provision of fresh fruit to estate employees and others. Two African computors have been taught statistical methods and are now capable of analysing the results of simple experiments.

Ukiriguru Experimental Station and Lubaga Sub-Station

The reports of the Chief Scientific Officer and Senior Scientific Officer of the Empire Cotton Growing Corporation are printed in the Reports of Technical Officers and Specialists as is that of the Department of Agriculture's Botanist at Ukiriguru. The latter is largely concerned with food-crop improvement.

It was, climatically, a good season for cotton. Jassid damage was slight, but bacterial blight was in evidence on poorly grown stands.

The laboratory and office block, ginnery, stores, and quarters were completed during the year, and are now all in use. The shortage of labour at both Ukiriguru and Lubaga resulted in serious interference with the experimental programme.

The effect of a three years' "tumbledown" fallow—broken up for the 1948-49 season and therefore in the third year of the cropping cycle—was significantly greater than that of a similar fallow which had been planted with local grasses and legumes. Responses to three years' rest under resting variants were still evident in experiments in the third, fifth, and seventh years of cropping.

Residual responses from single applications of organic manure have been significant, so far, up to the seventh season from application. Responses from superphosphate are recorded as lasting for at least three seasons from application. The value of nitrogen, in the form of a top dressing at flowering time, was confirmed.

Good tied ridges have given small increases in yield, significant in the case of bulrush millet, over poor untied ridges; the residual benefit of compost has been greater with tied ridges.

At Lubaga, this year, results from a trial of ridged cultivation compared with flat cultivation were inconclusive.

Seed of a new strain UK.51 was issued. The results of yield trials show satisfactory progress with selected material. A hybridizing programme has been started, to add resistance to bacterial blight to the Ukiriguru strains, and to improve the Jassid resistance of some of them.

In a time-of-weeding trial cotton could not be planted until mid-January. In spite of this, plots on land in good heart that were weeded early, and then kept clean, yielded over 900 lb. seed cotton per acre. Plots on which weed growth was allowed to develop after a first early weeding yielded around 100 lb. per acre only. A considerable delay prior to the first weeding reduced yields to a similar level.

From observations on plant appearance, it is not unlikely that the poorer growth and cropping resulting from delayed planting is linked with the leaching of accumulated soil nitrates by early falls of heavy rain.

Close contact is maintained with the field staff of the Department and there is no delay in extending proved good practices to the cultivator. UK.46 was in cultivation throughout the Province, with the exception of one district, and cropped well to the end of the season.

Mwabagole Rice Station

This station, near Ukiriguru, is under the charge of the Department's Botanist.

An eight-roomed labour-lines block, and two Recorder's houses, were built in 1951. These should ease the labour situation—which was difficult during the year. Owing to labour shortage and insufficient irrigation water at the beginning of the season the rice was planted late. For this reason, and owing to the Botanist's departure on vacation leave, the only trials conducted were one 25-variety trial with six replications and one 49-strain trial with eight replications. The results of these trials were not available in detail at the time of reporting.

One hundred and sixteen of last year's selections were kept for further observation and trial, the remaining 790 being discarded. Two hundred and ninety-four re-selections were made, and ninety-five selections were taken from among last year's introductions.

Cotton Experimental Station, Ilonga

This Eastern Province Station remained under the direction of a Senior Scientific Officer of the Empire Cotton Growing Corporation.

The ginnery building and foundations for the gins and engine were constructed. The forty-saw gin was received but installation awaited the arrival of the engine. The site for the proposed new laboratory was cleared and five houses and two labour-line units were constructed.

About 100 acres of cotton, comprising Ilonga and other selections, were planted for stock and the early stages of bulking. Very satisfactory yields were obtained, the better types giving 1,000 lb. of seed cotton per acre whilst maintaining their quality. One strain of cotton has been under trial for a sufficient period and bulking for general distribution is now planned. In confirmation of earlier work it was demonstrated that ten per cent D.D.T. plus three per cent B.H.C., with talc filler, was effective in controlling American Bollworm and Stainer when applied with hand dust-guns. Omission of the B.H.C. from the dust resulted in inadequate control. Spraying trials were carried out by a commercial firm in collaboration with the scientific staff of the Station.

Cotton is grown at the station in rotation with maize, and 100 acres of a ninety-day maize yielded approximately ten bags to the acre. The harvest of this Ilonga selection has a ready sale, as seed, to local planters.

Tumbi and Mwanhala Agricultural Stations (Western Province)

Tumbi

Rainfall was ample and well distributed, but shortage of labour seriously curtailed the planting programme. One replicated paddy cultivation experiment was carried out, the treatments involving the puddling-in of banana

trash, thatching grass, etc., but yield increases were not significant. The vermin-resistant "Liongo" cassava was multiplied and planting material was distributed. The Station maintained its collection of cassava varieties.

It has now been decided that this Station will be incorporated in the Veterinary Department's nearby Pasture Research Station, and when the 1950 planted cassava experiments have been harvested, and stocks of cassava have been transferred to Mwanhala, no further work will be done by the Department of Agriculture at Tumbi.

Mwanhala

Here, also, there was a scarcity of labour at planting time. Experiments planted and in progress during 1951 were designed to:—

(a) Show the effect on cassava yields of flat planting, and of planting on ridges of various widths.

(b) Show the effect on cassava yields of applications of silicophosphate, both alone and in combination with sulphate of ammonia and sulphate of potash, and of applications of organic manures.

(c) Show the first-season, and residual, effects of organic manures on yields of sorghums, cowpeas, and short-term maize. First-season yields of short-term maize manured with shed-manure were significantly higher than yields from plots manured with open-yard (kraal) manure.

The Station's livestock remained in good condition.

Mahiwa Experimental Station (Southern Province)

The Station is primarily concerned with rice, but a number of observation plots of other crops—including hibiscus, cassava, sorghums, oil palm, and pulses—are maintained. Some eight tons of paddy were harvested from the 1950 sowings, and much of this was sold for seed purposes. Nine tons of maize, and small tonnages of cowpeas and other crops, were grown. The experimental work on rice made little progress during the year, no significant results being obtained. Fry ponds and a breeding pond were constructed in order to gather information on fish-farming under local conditions.

A workshop, classrooms, dormitory, mess room and six blocks of labour-lines were constructed during the year, and a start was made with the construction of two houses for European staff. A light tractor and plough were obtained and put into use—and such mechanical equipment should overcome, to some extent, the labour difficulties which the Station has been experiencing. This, and other, development was made possible by allocations of funds under the Southern Province Development Plan.

Some serious losses of stock resulted from an outbreak of trypanosomiasis, and milk yields fell, due to the disease and its treatment.

The experimental programme for 1952 was laid down before the end of the year, and included: (a) a trial, with eight replications, of eighteen strains, selections, and bulks of paddy; (b) a trial, with eight replications, of methods of planting paddy; (c) a manurial trial with six replications, of balanced artificial

fertilizer and farm-yard manure as dressings for paddy. These trials, together with observation plots of local and selected paddy, stock plots of maize bulks, plots of hibiscus under preliminary trial and observation plots of pasture grasses, were planted before the end of 1951. Observation plots of *Leucaena glauca*, Canadian Wonder beans, pigeon peas, and soya beans are planned, as is the bulking-up of mosaic-resistant cassava, white-seeded sesame and a dwarf white sorghum. A number of dwarf sorghums will be the subject of a yield trial, with three replications.

Fisheries (Fish-Farming)

The Fisheries Officer (Fish-Farming) was on leave from November, the Station at Korogwe being put on a "care and maintenance" basis for the remainder of the year. When the third Fisheries Officer (Inland) arrives in 1952 the work on fish-farming and the fisheries of lakes and rivers should progress to the stage where a start can be made on the problems of sea-water fish-farming.

At Korogwe twenty-three fresh-water ponds were in use—for breeding, fry, the production of marketable fish, trials of fish production associated with paddy cultivation, and other experimental work. A rest-house for visitors was constructed and the accommodation for African Instructors under training was improved and extended.

Six species of *Tilapia* were the subject of trials and experiments, which included the trial of Malayan and Tanganyika strains of paddy in association with fish production, with a view to the choice of varieties with growth periods and depth-of-water tolerances suited to fish production; investigation of the growth-rates of unfed fish; trials of direct feeding and the use of fertilizers to promote algal growth; and assistance to the East African Malaria Unit in an inquiry into the effects of *Tilapia* spp. on the pond-population of mosquito larvae and the toxicity to fish of certain larvicides.

The figures below indicate the type of yield which is being obtained in the Korogwe area:

Pond : "No. 18" *Area* : 1·8 acres (shallow ended, productive area thereby reduced by about forty per cent.)

Stocking : 2,100 fry (*Tilapia melanopleura* and *T. esculenta* in approximately equal proportions). Stocked in October.

Feeding, fertilization : Nil.

Harvest : Four months from stocking.

	T. melanopleura	*T. esculenta*	*Mixed Fry*
No. of fish 13-22 cm. ...	1,798 ...	1,216 ...	Not counted
Weight	413·5 lb. ...	204·5lb. ...	100 lb.

Rate of Yield : 1,197 lb./acre/annum.

Value : All fish, including fry, sold for fifty cents per lb. at pond.

Note : The fish had spawned at least once prior to harvest. The fry with which the pond had been stocked had grown to an average length of eighteen cm. and an average weight of three to four ounces.

Ten Instructors (from the Northern, Tanga, Eastern, Central, Lake, and Western provinces) attended a course of instruction in fish-farming at Korogwe, contact was maintained with officers of the Administration and with interested members of the public. Breeding and fry ponds were constructed at Mahiwa

(Southern Province) and Dabaga (Southern Highlands Province) for observation and to provide a local supply of fry.

Production ponds were constructed in the Korogwe area by a firm which operates a number of large sisal estates, for the purpose of supplying fresh fish to their staff and labour. In Sukumaland (Lake Province) the number of production ponds at Malya was increased to four, and eight dams and hatirs were in use for production and breeding—the work being instituted by the Sukumaland Development Organization. The Prisons Department operated a fish-farm at Moshi, the yield forming part of the prisoners' ration. Fish-ponds are being constructed under the Uluguru Land Usage Scheme in the Eastern Province, and the water-supply dam at Handeni (Tanga Province) was stocked with fry, as were dams belonging to a number of private individuals in the Southern Highlands Province. An annual report by the Fisheries Officer (Fish-farming) for 1951 is not available.

Marine Fisheries

The arrival of the Fisheries Officer (Marine) permitted a start to be made with an investigation of the coastal fisheries of the Territory. This Officer's first report is printed in the Reports of Technical Officers and Specialists; it includes an outline of the fisheries as they exist at present. After further investigation and surveys it is hoped to be able to demonstrate the economic possibilities of a motor fishing vessel. Such a vessel, the *Patoni*, was being acquired by the Department at the end of the year.

Fisheries of Lakes and Rivers

The Fisheries Officer (Inland), while on leave in the United Kingdom during the first half of the year, selected a quantity of experimental fishing gear for use on Lake Tanganyika. This will be brought into use when the fitting out of the new forty-five-foot motor fishing vessel has been completed. The Lake Tanganyika *dagaa* fisheries had a prosperous year, and although production (1,214 tons of dried *dagaa*) was below the record figure of 1950 the value of the dried fish reached the substantial sum of £121,400, some £10,000 greater than the value of the 1,633 tons sold in 1950. A Nyasa native has started a small smoked fish business on the shores of Lake Tanganyika, and finds a ready market in the Belgian Congo. A European firm on the Malagarasi swamp buys *Tilapia* from native fishermen and smokes the fish for sale in the Congo. An investigation of Lake Rukwa, which had been closed to fishing since the drought of 1949, revealed a recovery of stocks but an appreciable reduction in the average size of breeding adults. The Lake Rukwa fisheries will be re-opened in 1952. Prices for wet-salted crocodile hides fell considerably during the year and hunting has declined. The annual report of the Fisheries Officer (Inland) is printed in the Reports of Technical Officers and Specialists.

Soil Conservation

The report of the Chief Soil Conservation Officer is printed in the Reports of Technical Officers and Specialists and records a year of noteworthy achievement.

Apart from the advisory, reconnaissance, constructional, and experimental work directly controlled by the Chief Soil Conservation Officer, there was much

activity on the part of District Teams and individual officers of the Department, who received guidance, advice, and courses of practical training from the Soil Conservation Service. Examples of such activity were:—

The Usambara Scheme: The basic soil conservation practices in use under this Scheme, which is financed by the local Native Authority and under the Development Plan, were the result of investigations under the Mlalo Rehabilitation Scheme (now concluded). Staff of the Department are continuously engaged in further inquiries and trials, and a Superintendent of Agriculture is working in the field under the direction of the District Team.

The Mbulu Development Scheme: This scheme was in the fourth year of a five-year plan for which Colonial Development and Welfare Funds were made available in late 1947. The Native Authority authorized free communal labour, and provided 600 acres for the establishment of a farm for the carrying out of trials and demonstrations and land for a number of sub-stations. Officers of the Department supervised a large number of trials and demonstrations, and also worked on the application of their findings to tribal land.

In addition to the large-scale schemes referred to, Departmental Officers in all provinces were concerned with the extension of soil conservation practices on native and non-native lands. Practices which are widely advocated after local trial included the tie-ridge system of cultivation; trash-bunding (often associated with live wash-stops); the discontinuance of annual arable cropping on over-steep slopes and along stream sides; tree planting; mulching; a change from, for example, eleusine, to crops less liable to accelerate erosion; terracing, where an adequate depth of top-soil existed; alternate grass and arable strip-cropping and other measures.

In many districts soil conservation measures, based on the advice of Departmental Officers, have been the subject of Native Authority rules. In other districts the work is, as yet, in the stage of demonstrations organized by the Department—the intention being to ask for Native Authority rules when the cultivators are familiar with the methods advocated and the purposes in view. The individual native cultivator seldom, if ever, undertakes soil conservation measures as a voluntary effort to preserve his land from erosion—but instances occur where, for example, tie-ridge cultivation is practised voluntarily owing to the better yields which are generally obtained when this method is used. Tree planting also is not infrequently undertaken for the primary purpose of ensuring a supply of fire-wood.

Over-grazing, usually as a result of a cattle population which is too high for the existing systems of land-usage, has been under active consideration by the Natural Resources Board and the District Teams. The reduction of stock population, where overstocking is injuring the land, and the opening up of new areas to allow of the increase necessary to cover the Territory's expanding demand for meat and dairy products are difficult problems which will take years to solve. There are signs of an extension of the existing, but not widespread, native practice of stall-feeding (as a supplement to grazing) and it is in this sphere, in particular, that officers of the Department have been able to assist by stimulating and facilitating the planting of fodder-crops.

Mechanization Trials

Some forty (wheeled and crawler) tractors, and four self-propelled combine harvesters, were in use during the year on mechanical cultivation schemes and trials, either under the full management or field supervision of the Department, and on the Department's farms and experimental stations.

A wealth of experience has been accumulated, and some definite conclusions have been reached regarding the suitability--and unsuitability--of a number of types of tractors and implements for use under the varying conditions encountered in the Territory. In the rice-land ploughing schemes, after the initial land-breaking, it has been found that a medium-powered crawler tractor in the forty to fifty b.h.p. class and a heavily built six-disc plough is a successful combination. On lighter lands, and for light-draft operations on the heavier lands, wheeled tractors of around forty b.h.p. have been found satisfactory. Light wheel-tractors in the twenty to thirty b.h.p. class have been found of use for ploughing on those, somewhat rare, light soils which do not set hard during the dry season, and for light-draft operations on the heavier soils after ploughing and discing by more powerful machines.

Where light tractors can combine small-scale ploughing on light land with manure and produce transport, as has been tried with success in the Lake Province, they have proved popular. It is this type of tractor, generally not diesel-engined, which has been purchased in a few instances by individual natives for their own use and for the ploughing, at a charge, of neighbouring holdings.

Planters, drills, and combine harvesters are widely and successfully used by non-native farmers, particularly on the light volcanic soils of the Northern Province wheat-growing areas. The Department's trials of these implements have been largely under far more rigorous conditions, often on recently broken valley-bottom land or tractor-ploughed native rice-lands. Such use puts a very severe strain on these usually lightly-built implements, weak points being revealed in the early stages of use. In the Rufiji and Ulanga Districts, areas of paddy which had been hand-sown on tractor-ploughed land were successfully harvested by a twelve-foot self propelled and a six-foot tractor-drawn combine harvester, but the uneven surface which had developed since ploughing was a severe handicap. Such hazards as hippopotamus tracks and porcupine holes can, and do, develop overnight--eventualities perhaps not visualized by the European and American designers of such implements as have been available for trial in this Territory. Crawler-tracked combines may be required, and swathers and pick-up attachments have been found necessary unless the crop is nearly weed-free. The use of non-ductile castings in certain maize planters resulted in undue breakages, but grain drills were, in general, more satisfactory.

Each crop, each season, and each area, has its specific problems of timing and cultivations, and much has been learnt regarding the mechanized—or partially mechanized—farming of lands hitherto sporadically hand-cultivated or entirely uncropped. One problem is general--that of weed control. Well-timed ploughing and cultivations go far towards providing the solution, but in any year (and 1951 was no exception) untimely rains frequently upset the tillage programmes. Preliminary trials with selective weed-killers in rice-land, where sedges are often the principal weeds, have been inconclusive but far from discouraging.

Owing to the very limited commercial servicing facilities, and serious difficulties regarding the prompt delivery of spare parts, it has been found that in most areas ploughing schemes must, to be efficient, be of a size to warrant the use of several (probably four or more) tractors—backed by a workshop and spares-store. Dependence on single tractors, limited or distant repair facilities, and the supply of spares direct from the agents as needed has resulted in serious difficulties. The occasional individual African who has purchased a light tractor during the last few years has been facing the same situation—and will continue to do so until the amount of agricultural, or other, machinery in his area results in the provision of better facilities.

Mechanized Cultivation Schemes

There are now a fairly large number of schemes in the Territory which provide a ploughing service for Africans. So far, most of the schemes have been developed at sub-economic rates, but some are now nearing the stage when the full costs can, it is expected, be recouped. These ploughing services are normally administered by the District Commissioner or the District Team and are frequently under the field charge of officers of the Department of Agriculture.

In general, the problems encountered have been similar. A high degree of "trial and error" has necessarily entered into the procedure for deciding upon the most suitable tractors and implements, since the lands have often never before been ploughed. Inevitably, some initial choices were found unsuitable—as instanced by a decision to change from wheel-tractors with half-track conversions to full-track machines designed as such. This occurred in connection with the Rufiji Native Authority ploughing scheme, which has since become the most successful in the Territory, employing six tractors and now calling for an expansion of both equipment and staff. Delays involved in obtaining spare parts have affected every ploughing scheme in the Territory, in spite of there being East African agents—and in the case of one well-known make, even an East African factory depot—within a few hours by air and road. Instances have been all too frequent of well-known makes of tractors and implements being sold in the Territory when there was a totally inadequate local stock of spares. This situation has jeopardized the efficiency of ploughing schemes dependent upon single tractors. Yet, though schemes may be expected to employ a number of tractors as their popularity grows, it is by no means desirable to launch them with heavy initial capital expenditure on a team of tractors and extensive on-the-spot workshops and stores.

Ploughing schemes operating on land which has been cultivated previously have encountered considerable reluctance on the part of the African to accept realignment of his plots into aggregations having boundaries suited to tractor cultivation, but it has been found that this reluctance can usually be overcome after one or two seasons when the African is given the choice of realignment or no tractor-ploughing at all. It has been found difficult in the initial stages to collect ploughing charges in advance, and it has been found that a firm line on this point is essential for the success of any ploughing service. In the secondary stage, however, this situation is likely to change with remarkable rapidity. In the Rufiji, for instance, Africans had paid, in 1951, ploughing fees for upwards of 13,000 acres to be ploughed in 1951-52, an area beyond the present scope of the tractor teams.

One ploughing scheme, in the Pare District, employed a commercial ploughing contractor in addition to its own tractor and plough. Such a procedure may become more general as the Territory develops, so resulting in a change-over from Native Authority tractor-ownership to ownership by private contractors, who would undertake work for associations or co-operatives of Africans.

In the Usambara and Uluguru schemes for the improvement of land-usage in the over-crowded hills provision is made for the mechanical cultivation of expansion areas, and a beginning has been made with this work. The hill-dwellers are, not unnaturally, somewhat reluctant to cultivate under the less salubrious conditions of the fan-slopes and plains, and the success of the mechanical cultivation side of such schemes must be measured by the extent to which it achieves the object of attracting the hill-dwellers to these productive areas rather than by the degree of financial self-sufficiency which is achieved. There is, of course, a limit to the sums which can be spent on even the most desirable of such objects. It is, as yet, too soon to assess the value of the work that has been done.

The Kilangali Grain Farm, in the Eastern Province, is a "pilot" scheme financed by Government and managed by the Department of Agriculture. The aim of this farm is to determine the best means for the mechanized, or partially mechanized production of rice (or other grain) from hitherto uncropped land capable of irrigation. The report of the Agricultural Officer in charge is printed in the Reports of Technical Officers and Specialists.

Field Experiments, Southern Highlands

A Summary of the Report of the Agricultural Officer (Experiments) is printed in the Reports of Technical Officers and Specialists. On the whole, the year was a successful one from the experimental point of view. The rains were good, and rarely excessive in intensity, which ensured a satisfactory wheat crop; and a good "take" with excellent subsequent growth of tobacco.

The wheat fertilizer trials in the Iringa District showed significant responses to the application of nitrogen and phosphate, either as artificial fertilizers or in the form of dung and a phosphatic artificial fertilizer. Dung alone gave a valuable increase in yield, but its use was uneconomic unless the dressing was supplemented by phosphatic artificial fertilizer.

The fertilizer placement trials proved conclusively that considerable yield-increases result from the placement of fertilizer by means of a combined fertilizer and seed drill, and that even the simple drilling of a mixture of seed and fertilizer gives higher yields than where the fertilizer is broadcast. One is drawn to the conclusion that if even moderate yields of wheat are to be obtained in the area the recommended treatments must be followed.

Wheat variety trials were in their third season, and reached the stage where it was possible to recommend, with some confidence, a list of six varieties suitable for each of the two main altitude-ranges.

The work on pyrethrum—which benefitted by the whole-hearted interest and co-operation of the growers—revealed significant, and highly economic, responses to the application of superphosphate: the advantages of close planting, in single rows, on ridges, followed by thinning in the second year;

the advantages of locally selected strains as compared with introduced strains; and the benefits which derive from improving the fertility of nursery beds and from early planting and clean-weeding in the field.

Results from the tobacco experiments were less conclusive than those from the work on wheat and pyrethrum, but were such as to indicate very clearly the lines to follow up in the 1952 programme.

Only the main findings from the year's work are given in the summary of the annual report of the Agricultural Officer (Experiments). The full report is available to interested growers, and others, as a separate paper.

Beeswax and Honey

The price of beeswax rose to the remarkable figure of £750 per ton in early March, thereafter declining to the still very substantial price of £500 per ton and remaining at around that figure for the rest of the year.

The Beeswax Officer reports that there was a very noticeable improvement in the quality of beeswax offered for export, and attributes this in no small degree to the posting of Bee-keeping Instructors to those areas where, in the past, adulteration with *Trigona* wax has been rife. He has made an extensive study of this adulterant, which is the sticky secretion of a race of stingless bees.

The Beeswax Officer is encouraging the better preparation of honey, and has demonstrated that, besides being major providers to the world of "high bleaching quality" beeswax, the Territory's bees can produce very fine honey. The report of the Beeswax Officer is printed in the Reports of Technical Officers and Specialists.

Coast Agricultural Station, Chambezi

After considering various parcels of land around Dar es Salaam it was thought better to get away from town influences and finally it was decided to purchase two adjacent farms some ten miles to the south-west of Bagamoyo for development as a Coast Agricultural Station.

The total area is 1,500 acres upon which there are at present 386 acres of sisal and 430 acres of coconuts.

The work during 1951 has of necessity consisted of clearing and development, a somewhat slow process on a neglected sisal-coconut estate, and not much can be done in the way of experimental work until quarters for the officer-in-charge are completed.

Satisfactory progress with house building was made. The sisal was leased to a contractor on condition that after the sisal had been cut for fibre production the plants should be grubbed. A twenty-acre block of coconut was cleared of bush and preliminary work on roads and fire-breaks was commenced.

Morogoro Farm

The basic rotation of three-year *Panicum maximum* leys alternating with three years of arable cropping has been maintained. An area formerly in use as permanent pasture has been ploughed and is now being farmed by the Indian School of Agriculture.

A replicated trial of three methods of sorghum seed-dressing indicated that "Nomersan" and "T.M.T.D." were slightly more effective than sulphur in controlling smut.

Some work was done on paddy yields, planting dates for the Enyanza variety of sorghum, and the selection of dwarf types of Enyanza sorghum. Mosaic-resistant cassavas were multiplied, and planting material distributed; short-term maize, sunflower, cowpea and Enyanza Sorghum were multiplied, and seed was distributed to planters and experimental farms; some three tons of maize, sorghum, and sunflower were fed to the herd.

There was an outbreak of Trypanosomiasis in June, which affected milk-yields and resulted in the death of two of the seven head of stock which had been added to the herd earlier in the year. Cotton seed, maize, sorghum, sunflower seed, hay and silage were used in the ration, according to availability.

Some 12,000 plants were sold from the nurseries on the farm, this service being much appreciated by the public.

Kingolwira Prison Dairy Farm (Morogoro)

The farm came under the control of the Prisons Department from 1st January, 1951. The Regional Assistant Director of Agriculture, Eastern and Central provinces, is a member of the Management Committee.

Kungului Farm, Lushoto

This small station continued to be used, primarily, for the observation of potato varieties imported from the Scottish Society for Research in Plant Breeding, Corstorphine, Edinburgh. The work is directed towards finding varieties resistant or immune to *Phytophthora infestans*, and has been in progress for some years—with a setback in 1948 when a variety, hitherto immune, succumbed to a hitherto unrecorded strain of the pathogen.

Since their importation in 1949 three varieties have shown particular promise and of these one has remained, to all appearances, immune to *P. infestans* during eight successive plantings, and has yielded satisfactorily. The two others, though not showing such apparent immunity, have yielded unusually well. Tubers of two of these varieties were sent to Scotland, where stocks of them had been lost, and virus-free glass-house-grown stocks are now being multiplied there for possible use as nucleus stocks in the Territory.

Seventeen new potato varieties were imported from Scotland for trial early in 1951, some being of a type considered to be particularly suitable for the tropics.

The farm is used for the multiplication of *Pennisetum purpureum* and *Pennisetum salifex*, and many tons of planting material of these grasses were distributed under the Usambara Scheme. Ramie, flown from the U.S.A. by the Colonial Development Corporation, was planted for observation and multiplication. A non-replicated trial of some twenty varieties of sweet potato confirmed the unsuitability of low-altitude varieties for higher altitude cultivation, and gave an indication that the potential crop of the higher-yielding varieties is in the region of five tons per acre. All annual crops were grown on tied ridges, and ample manure is available from a small herd grazed on grass leys and stall-fed with elephant grass. Observation and demonstration plots of coffee, passion fruit, *Telfaria pedata*, *Mentha* spp., lavender, grasses, vegetables, etc., were maintained.

The Bukoba Coffee Sub-Station, Maruku

This experimental station has as its basic programme of work the study of ways and means of establishing Robusta coffee in open land—by trials of soil improvement, shading, and the means of creating that humid micro-climate which is essential for the well-being of Robusta coffee. The establishment, in the first instance, of a good stand of bananas is believed to be the best initial approach, and this work is making headway. Cattle-keeping, primarily for its fertility-building effects, is of equal importance in the programme, which therefore includes pasture-grass and grazing trials and trials of compost making and the feeding of supplements.

An Agricultural Officer was stationed at Maruku during the year. The main buildings were completed and labour lines and cattle sheds were started. Areas of couch-infested land were cleared, the established trials were maintained and a small start was made with further experimental work. Shortage of labour was a serious difficulty, but the Station was provided with a Ferguson tractor and a first consignment of implements, including a mower for the work which is being done on grass mulches.

The Banana Establishment Trial began to show the benefits of both farmyard manure and ammonium phosphate applications, and this trial is being supplemented by a number of microplot experiments—using eleusine as the indicator plant. The Grazing Paddock Trial is also beginning to show interesting results.

The Station herd was maintained at around fifty head.

AGRICULTURAL EDUCATION

The main concern of the Department was, as always, the training of its own African field staff in their instructional and advisory duties. With the aid of Development funds the expansion programme at Ukiriguru Training Centre was virtually completed during the year, and there are now permanent buildings for housing, feeding, and teaching, 120 students. Fifty-seven students (including nine teachers) completed their two years' training in June, nine First Class Certificates being gained. Sixty-one students completed the first half of their training in June, and after four months of field work returned for further study in November. An innovation during November was the start of a section composed of Mission Teachers, who find their own accommodation and attend the Training Centre daily. It has been noticeable that all entrants show great keenness and readiness to undertake practical work in the right spirit. Apart from the courses at Ukiriguru, a number of Instructors of the African field staff received short courses given by the European specialist officers concerned with fish-farming, apiculture and land usage, and informal refresher courses in a variety of subjects given by their European and African supervisors.

The Indian School of Agriculture, at Morogoro, ended its first term of work in January, 1951, the second term following without break until the end of April. The third term was from the 1st June to 31st August; the fourth term from 17th September to 21st December. This school was founded (in 1950) in order that Indians with a bias for agriculture might obtain a training comparable with that given by a farm institute in the United Kingdom—i.e. a training which would fit them for practical farm work and farm management.

The furnishing and equipment of the school was made more complete during the year, new items including a 230v. electric-light plant, a pick-up and a Ferguson tractor, and surveying, bee-keeping, dairying, and poultry-farming equipment. An area of the Department's Morogoro Farm was handed over to the school for practical farm work. During this first full year of the school's existence many aspects of organization and teaching were subjected to review, and plans were made for the future. Of the thirty students attending in January, 1951 twenty were from Tanganyika and ten from Kenya. Very few of the students –whose ability varied widely—had previous knowledge or experience of farming. A summary of the Education Officer's report is printed in the Reports of Technical Officers and Specialists.

The Department of Agriculture does not hold educational or training courses for the benefit of Europeans, apart from short courses of instruction in soil conservation and land usage, conducted at the Tengeru Centre, for the Department's European field staff. One such course, lasting six weeks, was held in 1951.

In addition to conducting the formal and informal courses of instruction, which have been described briefly in the above paragraphs, the Department is, of course, very fully engaged in advising and instructing agriculturists of all races, providing technical advice to Provincial and District Teams, and assisting the teachers in African schools to interest their pupils in better farming and land usage. The Department's experimental and research stations and farms are themselves of educational value.

COUNCILS, BOARDS AND COMMITTEES

The present holder of the post of Director of Agriculture is a Nominated Official Member of Legislative Council, chairman of the Tanganyika Coffee Board, the Cotton Board, and the Seeds Board, and a member of the Livestock Board, Natural Resources Board, Tanganyika Sisal Board, and the Tea Board. He is also a member of the Management Committee of the Sisal Research Station, and is a member of two inter-territorial bodies, the East African Advisory Council on Agriculture, Animal Industry and Forestry, and the Central Tea Committee. He attends meetings of the Pyrethrum and Tobacco Boards, is Executive Officer of the Natural Resources Board, and is Chairman of the Southern Highlands Non-Native Tobacco Growers' Union Limited.

The Regional Assistant Director of Agriculture, Arusha, is a member of the Tanganyika Coffee Board and the Seeds Board. Many officers of the Department are members of local boards and committees concerning crop production, land utilization, water, etc.

THE NATURAL RESOURCES BOARD

The Natural Resources Board, set up to safeguard the natural resources of the Territory and to promote correct land usage, consists of the Member for Agriculture and Natural Resources (Chairman), the Member for Local Government, the Director of Agriculture (Executive Officer), and five other members appointed by the Governor of whom four must be persons not holding public office. Two meetings were held during 1951.

The main problems with which the Board was concerned were:—

(i) the decrease in fertility by overstocking of land with cattle;

(ii) the construction of appropriate soil conservation works where erosion threatened; and

(iii) the adoption of approved soil conservation practices in erodible areas.

In connection with (i) measures were formulated for compulsory culling of the estimated annual increase in stock in certain specified areas where deterioration of fertility was known to be taking place as a result of overstocking.

In connection with (ii) the arrival of additional heavy equipment for the Soil Conservation Service enabled a considerable increase to be made in the areas treated by bench terracing and contour banking.

Plans were also made for an extension of the Soil Conservation Service to the Southern Highlands Province, and such extension began.

In connection with (iii), the assistance of all administrative and field officers was sought in awakening in the population an appreciation of the necessity of adopting correct land use practices. Recommendations were also made regarding the setting up of Soil Conservation Councils to promote correct land use in limited and defined natural areas.

In addition, Soil Conservation Courses attended by Administrative, Agricultural, and other field officers, were held at the Soil Conservation Centre, Tengeru.

LEGISLATION

The following was the principal legislation related to agriculture, enacted during 1951:—

Coffee

The Defence (Sale of Coffee) Order, 1951, appointed the Tanganyika Coffee Growers' Association, Ltd., as sole purchasing agents for all coffee grown in the Eastern and Central provinces. This Order brought the Eastern and Central provinces under similar control to that in force in the Northern and Tanga provinces and in the Southern Highlands Province.

The Bukoba Native Coffee (Levy) Order, 1951, imposed an annual levy at the rate of Shs. 120/- per ton and *pro rata* of hulled coffee upon all coffee grown and produced by Africans in the Bukoba District and sold in accordance with directions under the Bukoba District Native Coffee (Compulsory Marketing) Order, 1951.

The Bukoba District Native Coffee (Compulsory Marketing) Order, 1951, orders the compliance of all Africans growing and producing coffee in the Bukoba District with any direction of the Bukoba Native Coffee Board as to the sale of such coffee.

The Produce Export (Bukoba Coffee) Rules, 1951, relate to the submission for examination, sampling, grading and passing or rejecting for export of coffee, other than parchment coffee, intended for exportation from the port of Bukoba, and for the marking of bags containing such coffee.

Tobacco

(See also under Plant Protection)

The Tobacco (Non-Native Industry) Rules, 1951, apply only to tobacco grown in the Southern Highlands Province and intended for sale, and order that all such tobacco be graded, packed and marked by the Southern Highlands Non-Native Tobacco Growers' Union; and that lawful levies be payable by the buyer of the tobacco in specified ways; direct certain functions to be carried out by the Non-Native Tobacco Board; and provide for the registration and submission of returns by tobacco growers, and specify conditions under which certain tobaccos might be removed from the Province.

Sisal

The Trades Licensing (Purchase and Sale of Native Produce) (Sisal) Order, 1951, declared certain areas within which the purchase and sale of native-produced sisal was controlled. The purpose of the Order was to safeguard the adequate planting of food crops by natives.

The Sisal Industry (Registration) (Amendment) Rules, 1951, specified a new form of Plantation Return.

Tea

The Tea (Cess) Order, 1951, imposed a cess of three cents per pound net weight in respect of all tea manufactured in the Territory and an acreage cess of Shs. 2/- under Section 21 of the Tea Ordinance.

The Tea Rules, 1951, made under Section 29 of the Tea Ordinance, 1950, provided for tea export returns to be made, the payment of poundage and acreage cesses to the Tea Board, and for the issue, transfer, reallocation and cancellation of tea export permits by the Tea Board.

Cotton

The Purchase of Native Cotton Order, 1951, orders that no person shall buy native-grown cotton in specified areas prior to specified dates, or shall buy other than Grade "A" cotton for five weeks from and after the specified dates.

The Cotton (Amendment) Rules, 1951, amend the Cotton Rules of 1949 in respect of the transport of raw cotton and the safe and sufficient storage of raw cotton, cotton seed, and cotton lint.

The Cotton (Uprooting and Burning) Order, 1951, orders the uprooting and burning, by specified dates, of all cotton plants, residues and refuse in or near cotton fields in specified areas.

The Cotton (Quarantine Area: Southern Province) Order, 1950 was the subject of a Government Notice published in 1951 and ordered that the Kilwa and Ruponda districts and parts of the Lindi and Masasi districts shall be cotton quarantined areas and that no person shall sow cotton seed in such areas (or remove raw cotton or cotton seed therefrom without permit) but provides for the sowing of cotton seed by the Overseas Food Corporation for experimental purposes.

Plant Protection

(See also under: Cotton, Tobacco, Locusts, Native Authorities)

Orders, Rules and Notices under the Plant Protection Ordinance declared (latest) uprooting and (earliest) planting dates for *tobacco* in certain areas, declared *Banana Wilt* and *Bacterial Blight of Pea* to be diseases for the purpose of the Ordinance, and, as regards *Banana Wilt* declared certain areas to be infected areas and required the reporting of infections or suspected infections.

Locusts

The Destruction of Locusts (Amendment) Regulations, 1951, amend the Destruction of Locusts Regulations, 1929 by a re definition of an Inspector under the Regulations.

The Locusts (Amendment) Ordinance, 1951, amended the principal Ordinance by making provision for certain powers to be given to officers of the Desert Locust Control.

The Destruction of Locusts (Amendment) (No. 2) Regulations, 1951, amended the principal regulations as provided for in the above mentioned amending Ordinance.

Fisheries

The Fisheries Ordinance (Commencement) Order, 1951, appointed 26th October, 1951, as the day on which the Fisheries Ordinance, 1950, came into effect.

The Fisheries (Lake Rukwa Controlled Area) Order, 1951, established the Lake Rukwa Fisheries Board, for the purpose of controlling and regulating the capture, killing, preparation and disposal of fish and fish products within specified areas of Lake Rukwa.

Seeds

The Export Seeds (Amendment) Ordinance, 1951, the Export Seeds (Tanganyika Seeds Board) (Amendment) Rules, 1951, the Exports Seeds (Permits) Rules, 1950 (published in 1951) and a Notice under Section 2 of the Exports Seeds Ordinance defined "seeds" and "contract", and amended the constitution of the Seeds Board and its powers and membership.

Pyrethrum

The Pyrethrum Industry (Levy) Order and the Pyrethrum Industry (Collection of Levy) Rules provided for levies of twelve cents per pound (avoirdupois) on the sale of pyrethrum produced in the Southern Highlands Province, and five cents per pound (avoirdupois) on the sale of pyrethrum produced elsewhere in the Territory.

African Produce: Control and Marketing Boards

The African Agricultural Products (Control and Marketing) (Amendment) Ordinance, 1951, amends the provisions of the African Agricultural Products (Control and Marketing) Ordinance as regards the powers, functions and obligations of Boards established under the principal Ordinance, and makes new provisions.

(See also under crop headings)

Non-Native Production

A Proclamation under Section 35 of the Crops (Increased Production) Ordinance declared that the Ordinance shall remain in force until 31st December 1952.

Native Authorities

(*Beeswax, Honey, Weeds, Cassava Scale*)

A Notice under the Native Authority Ordinance, etc., sanctioned the making of Orders by Native Authorities of the Western Province for the purpose of improving beeswax and honey production and controlling the marketing of beeswax and honey and the waxes of other insects.

A Notice under the Native Authority Ordinance, etc., sanctioned the making of Orders by the Native Authorities of the Central Province for the purpose of preventing and controlling the spread of the weeds *Striga asiatica* and *Alectra abyssinica* and for eradicating the said weeds.

A Notice under the Native Authority Ordinance, etc., sanctioned the making of Orders by the Native Authorities of the Lake Province for the purpose of controlling the spread of cassava scale.

PUBLICATIONS

Articles sent to the Editor, *East African Agricultural Journal*, for publication during the year 1951, were as follows:—

January issue:

"The Oil Palm in Western Tanganyika" by D. Shepstone.

"A Note on Antestia Control with D.D.T. and Bordeaux Mixture" by F. B. Notley.

April issue:

"Preliminary Report on Trigona Wax" by F. G. Smith.

July issue:

"Bacterial Blight of Peas" by G. B. Wallace and Maud M. Wallace.

October issue:

"Beekeeping Observations in Tanganyika" by F. G. Smith.

The following publications were made during the year:—

Departmental Pamphlets

No. 50. Notes for Beekeepers in Tanganyika.

No. 51. Diseases of French or Dwarf Beans.

(*Fisheries Series*) No. 2. Progress of Fish-farming in the Territory.

Departmental Mycological Circulars

No. 30. Report on Plant Diseases in the Southern Highlands Province, February-March, 1951, by the Plant Pathologist.

No. 31. Tanganyika Fungus List: Recent Records No. XV.

Departmental Leaflets (General)

No. 17. Preparation of Honey for Retail Sale.

No. 18. Sababu ya Kutowaangamiza Nyuki.

No. 19. Kutengeneza Nta ya Biashara.

No. 20. Beekeeping Posters (in Kiswahili).

Sundry Leaflets, Papers, and Contributions to Journals (Published 1951)

A Wilt Disease of Bananas—G. B. Wallace (*Tanganyika European Council Bulletin*, October, 1951).

White Borer in Coffee—R. G. Tapley (for Tanganyika Coffee Board).

D.D.T. and Discretion—R. G. Tapley (for Tanganyika Coffee Growers' Association).

Population Studies on Hylobius abetis, L.—G. Swaine (*Ann. Appl. Biol.* 38.3).

Technical Considerations in the Economic Development of Sukumaland—N. V. Rounce (*Empire Journal of Experimental Agriculture* XIX. 76).

CONCLUSION

I should like to express appreciation of the services rendered by all ranks during this successful agricultural year and in particular to mention the success being achieved by the young farmers' sons, so many of whom are engaged—as Agricultural Assistants—in teaching the use of machinery to Africans. The elder members of the staff have heavy responsibilities in supervising the work of so many officers who have as yet little experience, but they are encouraged by the keenness and technical ability of the new Agricultural Officers now arriving from post-war training.

A large number of private farmers have given invaluable help as members of agricultural boards and committees and their assistance is gratefully acknowledged.

C. E. J. Biggs,
Director of Agriculture

MONTHLY RAINFALL IN INCHES FOR SEASON 1950/51 AND YEAR 1951 AT PROVINCIAL STATIONS

	Eastern Province MOROGORO		Central Province DODOMA		Western Province TABORA		Lake Province MWANZA		Southern Highlands Province IRINGA		Northern Province ARUSHA		Tanga Province LUSHOTO		Southern Province LINDI	
	Ins.	Average 31 years Ins.	Ins.	Average 12 years Ins.	Ins.	Average 40 years Ins.	Ins.	Average 23 years Ins.	Ins.	Average 20 years Ins.	Ins.	Average 27 years Ins.	Ins.	Average 36 years Ins.	Ins.	Average 11 years Ins.
October 1950 ...	1·46	0·88	0·21	0·23	1·98	0·54	3·79	1·85	0·15	0·22	0·21	1·33	1·59	1·25	1·73	0·50
November... ...	1·23	2·09	0·03	1·40	1·19	4·07	3·28	4·67	1·64	1·57	1·31	4·28	3·11	3·85	0·38	2·22
December ...	1·22	2·74	2·47	3·22	9·26	6·62	5·40	5·55	2·78	4·75	0·97	4·09	1·66	4·38	4·93	6·00
		Average 32 years		Average 13 years		Average 41 years		Average 24 years		Average 21 years		Average 28 years		Average 37 years		Average 12 years
January 1951 ...	3·12	3·91	5·13	5·28	8·91	4·90	7·12	3·60	8·11	6·93	2·08	2·31	3·05	3·01	5·37	5·84
February	7·04	3·69	4·43	3·57	4·61	4·98	3·04	4·21	4·69	4·90	2·36	3·37	3·11	2·91	3·96	4·21
March	3·85	7·26	4·71	5·07	7·81	6·72	10·28	6·02	8·61	6·99	6·36	7·16	3·72	5·78	6·88	6·39
April	6·08	8·24	5·52	1·48	12·90	5·23	6·80	5·54	4·97	3·36	16·98	14·77	3·84	9·19	2·16	7·10
May	3·71	3·84	0·03	0·14	0·66	1·10	2·55	3·65	0·00	0·55	11·89	8·17	9·74	7·23	0·63	1·37
June	0·91	1·14	0·00	0·07	0·00	0·12	3·49	0·66	0·74	0·04	1·14	1·35	1·47	2·15	1·30	0·34
July	0·67	0·54	–	0·00	0·00	0·00	0·63	0·57	0·00	0·00	0·71	0·55	2·91	1·36	0·02	0·36
August	0·21	0·38	0·00	0·00	0·19	0·04	0·21	0·84	0·00	0·02	0·26	0·78	0·47	0·87	0·39	0·20
September ...	0·01	0·66	0·00	0·00	0·05	0·28	0·85	1·81	0·00	0·12	0·20	0·84	0·10	0·68	0·00	0·54
Total for season ...	29·51	35·37	22·53	20·46	47·56	34·60	47·44	38·97	31·69	29·45	44·47	49·00	34·77	42·66	27·75	35·07
October	1·09	0·90	0·01	0·23	1·08	0·58	1·71	1·93	0·13	0·21	3·45	1·29	5·48	1·26	0·57	0·60
November... ...	5·66	2·06	0·58	1·30	5·82	4·00	6·76	4·61	1·71	1·58	–	4·17	4·97	3·83	3·99	2·08
December ...	9·31	2·69		3·17	9·03	6·68	15·10	5·54	5·23	4·66	–	3·99	7·26	4·31	5·91	5·92
Total for year 1951	41·66	35·31	20·41	20·31	51·06	34·63	58·54	38·98	34·19	29·36	45·43	48·75	46·12	42·58	31·18	34·95

All figures quoted in the above table are abstracted from Summaries of Rainfall records for the years 1950 and 1951 issued by the East African Meteorological Department.

EXPORTS FROM TANGANYIKA OF AGRICULTURAL PRODUCTS, 1946 TO 1951

The following table shows the principal exports of the Territory since 1946 with the values of those for 1951

	Maximum output for export prior to 1950		1946	1947	1948	1949	1950	1951	Total value for 1951
			Amount	Amount	Amount	Amount	Amount	Amount	
	Year	Tons	Tons	Tons	Tons	Tons	Tons	Tons	£
Sisal	1942	136,237	111,521	95,856	117,092	132,541	118,909	142,106	23,689,454
Cotton Lint	1941	13,106	3,958	7,045	9,893	10,800	7,006	8,315	2,766,532
Coffee	1935	18,588	10,021	13,858	11,268	12,040	14,991	16,565	4,502,852
Groundnuts	1936	22,786	475	3,534	3,129	838	75	3,499	351,652
Sunflowers	1949	5,228	–	–	2,298	5,228	8,911	9,512	452,769
Copra	1928	9,318	312	40	48	3,585	886	–	–
Sesame	1938	5,241	929	493	928	6	–	22	1,980
Rice	1938	17,965	70	2,615	6,450	1,547·6	30	151	5,282
Millet and Sorghums	1928	7,732	315	4,741	1,914	74·5	1½	4,137	8,878
Maize	1948	3,070	–	1,875	3,070	105	7	559	13,799
Beeswax	1948	905	732	410	905	525	315	673	363,858
Honey	–	–	–	–	–	–	1	–	–
Hides and Skins	1947	4,609	3,527	4,609	3,310	4,059	5,471	4,023	1,674,165
Sugar	1941	5,454	315	838	568	5	2	5	280
Gums (Copal and Arabic)	1944	2,567	1,540	1,554	1,490	878	110	1,788	121,270
Ghee	1942	1,385	327	44	272	54·9	2,318 27	4	952
Wheat	1945	4,511	324	–	–	0·7	·3	–	–
Tobacco (unmanufactured)	1948	1,421	924	667	1,421	1,073	1,130·5	781	159,377
Rubber	1944	1,314	1,019	49	54	18	8·4	20	5,931
Tea	1946	625	625	446	462	427	484	821	233,581
Vegetable oils (Coconut and Groundnut)	1940	2,268	1,009	900	1,463	933·1	1,400	130	19,856
Papain	1948	130	100	109	130	119·8	19·6	18	65,450
Onions	1948	2,418	1,925	1,754	2,418	275	296	446	15,129
Pyrethrum	1945	697	668	241	170	141	175	149	44,168
Fats, including substitute for Ghee and Butter	1944	1,247	783	71	1,689	6	20	123	16,263
Mangrove Bark	1942	7,291	5,490	3,408	–	1,446	857	828	17,174
Wattle	–	–	–	–	–	–	1,976	1,318	39,269
Cashewnut	–	–	–	–	–	–	6,532	8,165	335,850
Castor Seed	–	–	–	–	–	–	3,302	7,570	675,080
Kapok	–	–	–	–	–	–	653	381	117,334
Palm kernels	–	–	No figures available			–	323	334	20,546
Beans and pulses (including seed)	–	–	–	–	–	–	8,078	10,638	471,982
Cassava	–	–	–	–	–	–	142	6,342	113,292
Essential oils (in lb.) :									
(a) Lemon grass	–	–	–	–	–	–	1,543lb.	2	4,003
(b) Orange	–	–	–	–	–	–	18,828lb.	4	5,462
(c) Geranium	–	–	–	–	–	–	75lb.	–	–
(d) Others	–	–	–	–	–	–	1,539lb.	–	–
Total	–	–	146,909	145,157	170,451	176,726·6	184,467	229,429	36,313,470

LIST OF EUROPEAN STAFF ON THE 31ST DECEMBER, 1951

Director : C. E. J. Biggs, B.Sc., Dip. (Agric.) (Wye), Dar es Salaam.

Deputy Director : J. R. P. Soper, B.A. (Cantab.), On leave.

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Chief Soil Conservation Officer :
D. Thornton, B.Sc., Tengeru.

Senior Research Officers :
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G. W. Lock, O.B.E., N.D.A., N.D.D., A.I.C.T.A., Ngomeni, on leave.

Entomologists :
G. Swaine, B.Sc., Morogoro.
R. G. Tapley, B.Sc., Lyamungu.
A. J. Jones, B.Sc., Iringa.

Plant Pathologist :
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R. W. Collett, Singida.
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D. H. Drennan, B.Sc., Dip. Agric., Lindi.
A. H. B. Childs, F.L.A.S., M.R.A.C., Tanga.*
C. G. Glegg, Dip. Hort., Dodoma.*
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A. Jefferiss, B.Sc., Dar es Salaam.
N. E. S. Mutter, B.Sc., On leave.*
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I. Constantinesco, B.Sc., Mbulu.*
A. Hamersley, M.B.E., B.Sc., Kilosa.*
G. K. Reakes-Williams, B.Sc., Dip. Agric., Maruku.
C. G. Birch, B.Sc., Morogoro.
M. J. W. English, B.A. (Agric.), Ilonga.*
A. E. Carlaw, B.Sc. (Soil Cons.), Iringa.*
A. Sykes, B.Sc., Musoma.*
D. P. Allan, B.Sc., Lyamungu.*
K. Johansen, B.Sc., Tengeru.*
R. F. Loxton, B.Sc. (Soil Cons.), On leave.*
W. G. Mathewson, B.Sc., Utete.
R. Frank, B.Sc., Iringa.
D. V. Chambers, B.Sc., Lindi.*
J. Russell, B.Sc., Dodoma.*
N. R. Fuggles-Couchman, B.Sc., Dip. Agric., A.I.C.T.A., Kilangali.*
J. Szostakowski, B.Sc., M.Sc., Bukwimba.*

*Served with Forces.

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J. M. Szymanski, Dip. Agric., Ngwina.*
J. R. Sang, Tunduru.*

Agricultural Officer (Ginnery) :
E. Drakley, Mwanza.

Beeswax Officer :
F. G. Smith, B.Sc. (Forestry), Tabora.*

Fisheries Officers :
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R. E. Gould, On leave.*
E. H. O. Martin, B.A., Dar es Salaam.*

Superintendents of Agriculture :
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R. B. Silcock, M.B.E., Lushoto.

Secretary, Lake Province Cotton Committee :
P. H. Le Riche, Mwanza.

Soil Conservation Officers :
T. H. Evans, Tengeru.
J. D. Evans, Tengeru.

Mechanical Foreman :
G. H. Bate, Tengeru.

Agricultural Assistants :

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F. Parke, Ilonga.
T. W. H. Dore, Arusha.*
G. H. McGavin, Shinyanga.*
P. G. Lewis, M.M., Moshi.*
V. Allen, Mwanhala.*
W. E. Yeo, Oltonyi.
J. F. Tregarthen, Masasi.*
A. M. Pienaar, On leave.*
E. Hall, Same.
R. C. Faun, Mbeya.*
K. H. Grooves, Lyamungu.
L. B. Neary, Bagamoyo.*
A. Jackson, Mahiwa.
A. Priestner, Songea.*
S. D. Pyman, Tukuyu.*
H. E. Hubbard, Kilangali.*
R. A. Brown, On leave.*
W. I. Reece, Mpwapwa.
F. W. Jollands, Malya.*
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H. W. Stubbings, Kwimba.
A. J. R. Jenkins, Biharamulo.
D. F. Phillips, B.Sc., Sumbawanga.*
E. J. Richards, Handeni.
J. Papps, Korogwe.
D. C. Randall, Ukiriguru.*
P. E. Chaplin, Tanga.
J. R. Tile, Kingolwira.*
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C. L. P. Heath, North Mara.*
P. J. Evans, Chambezi.*
K. W. E. Bindloss, Malya.
G. W. Edwards, Moshi.
R. F. A. Clark, Shinyanga.*
D. D. Bleasdale, Mgeta.*
H. G. Tomkins-Russell, Kisarawe.*
W. J. H. Le Bechee, Newala.
T. Drew, Kilangali.*
C. Decker, Mwanza.
A. E. Favell, Bukoba.*
D. H. Thwaites, Ngara.
D. Shepstone, Kahama.
L. J. Lloyd, Kisarawe.
T. J. Taverner, Tengeru.*
J. C. Van Schoor, Chunya.*
D. R. A. Goode, Kondoa-Irangi.*
R. Simpson, Mbosi.
J. I. Thomson, Lyamungu.*
G. L. Goodhew, A.I.B.A.E., Kilangali.
V. C. Allen, Maswa.*
R. C. Flint, Kibondo.
J. M. Van Dyk, Mahenge.*
T. E. Oliver, On leave.
J. Little, On leave.
W. J. V. Jones, Ngudu.
J. M. Ainley, On leave.
B. J. Lumby, Njombe.
M. J. Routh-Herdon, Mwanza.
J. R. Bellamy, Geita.
S. M. Clark, On leave.*
H. E. Dickinson, Geita.*
H. H. Sharpin, Kwimba.*
M. E. Sacre, Ngara.
A. W. Thompson, Ngomeni.*
M. W. Tustian, Shinyanga.
M. S. Kemp, Ruponda.
H. J. Gooding, Mwanza.
R. Duncan, Ukiriguru.*
D. Richards, Tengeru.*
W. D. Buchanan, Ukiriguru.*
J. W. Packard, Ngomeni.*
J. Weir, Iringa.
G. S. Sheriff, Kigoma.*
J. Lewton-Brain, Kilosa.*
J. Macer-Wright, Nassa.
D. Bullen, Maswa.
P. S. Hogg, Kasulu.
A. J. Krieg, Mwanza.

*Served with Forces.

Executive Officers, District Production Committees :
B. G. Ellison, Moshi.
P. L. A. Hill, Iringa.

Entomologist's Assistant :
Miss C. A. Blair, B.Sc., Morogoro.

Education Officers :
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Temporary Scientific Assistant :
Mrs. M. Wallace, B.Sc., M.Sc., Lyamungu.

Secretary :
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Horticulturist :
L. M. Fernie, B.Sc. (Hort.), Lyamungu.*

Office Superintendent :
K. C. Pearson, Dar es Salaam.*

Junior Agricultural Assistants :
I. B. W. Friend, Lyamungu.
A. D. P. Angelini, Lyamungu (Temporary).

Stenographers :
Miss J. A. Masters, Dar es Salaam.
Miss A. M. Pollard, Arusha.
Miss M. S. Taylor, Mwanza.
Mrs. M. Birch, Morogoro (temporary).

*Served with Forces.